...HNOLOGY DEPT.

the OIL AND GAS JOURNAL

TECHNOLOGY DEPT.

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DEC 2 1950
DETROIT

Savings to Both Contractor and Producer

WITH FRANKS WELL SERVICING & WORKOVER UNIT THE PAST 12 MONTHS . . . . . .

Says Large West Texas Contractor

ROD & TUBING PULLING · SWABBING

G. & W. WELL SERVICING CO.

1725 NORTH GRANT AVE. PHONE 4931 AND 1[illegible]

ODESSA, TEXAS
October 26, 1950

Franks Manufacturing Corporation
Box 3218
Tulsa, Oklahoma

Gentlemen:

We believe you will be interested in learning what our Franks "Telescoper" rotary work-over and general well servicing unit has done in the past twelve months.

The rig has been working continously in this time, completing 21 contracts consisting of 12 work-over jobs and 9 completions. Some of these jobs ranged as deep as 11,500' working with 2 7/8" drill pipe. The time between each job has averaged 2½ days. During the year we have been down less than 3 days for rig maintenance.

The reasons the rig has accomplished so much work in this time is the faster moving from well to well with quicker rig-up and rig-down. This means less lost time to the contractor and quicker service for the producer with consequent savings for both.

We are extremely pleased with the work this rig can perform as are producers in this area.

Very truly yours,

G. & W. WELL SERVICING COMPANY

BY E. J. Gisin

Franks Model 137 DTD Telescoper self-propelled Servicing and Workover Unit Owned by G. & W. Well Servicing Co.

FRANKS MFG. CORP. TULSA
WELL SERVICING AND DRILLING UNITS

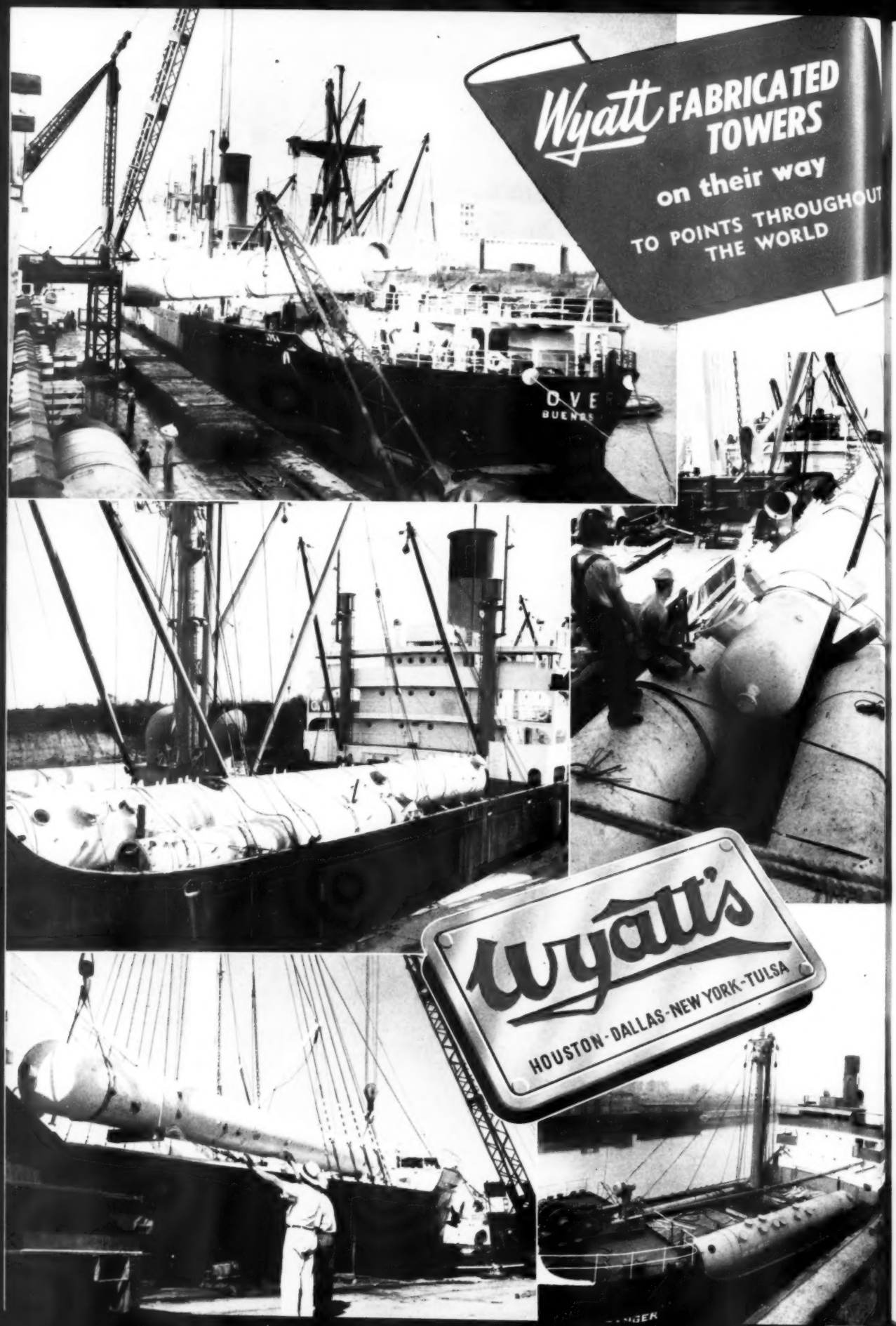
"on the SPOT" FIELD SERVICE

Although Franks units are noted for their long, maintenance-free operation, to assure users of the utmost value and least possible down time, Franks maintains "On The Spot" service centers at Odessa, Kilgore, Houston, Alice, Great Bend, Mt. Vernon, Casper, Compton, Seminole, and Tulsa. Each is complete with stocks of parts, factory trained personnel, shop facilities, and 24-hour service.

FRANKS MANUFACTURING CORP.
Box 3218 Tulsa, Oklahoma
Export: 149 Broadway, New York

PRICE 50 CENTS TABLE OF CONTENTS PAGE 33 **NOVEMBER 30, 1950**

XUM


Wyatt FABRICATED TOWERS
on their way
TO POINTS THROUGHOUT THE WORLD
Wyatt's
HOUSTON - DALLAS - NEW YORK - TULSA

seamless • welded
carbon • alloy • stainless

TUBING SATISFACTION for ALL refinery requirements

A Wide Choice of Service-Proved Analyses to meet ALL conditions of corrosion, pressure, temperature and oxidation

Carbon Steel	
Carbon Moly Steel	(½% Mo)
Croloy ½	(½% Cr, ½% Mo)
Croloy 1¼	(1¼% Cr, ½% Mo)
Croloy 2	(2% Cr, ½% Mo)
Croloy 2¼	(2¼% Cr, 1% Mo)
Croloy 3-M	(3% Cr, 1% Mo)
Croloy 5	(5% Cr, ½% Mo)
Croloy 5-Si	(5% Cr, ½% Mo, 1½% Si)
Croloy 5-Ti	(5% Cr, ½% Mo, ½% Ti)
Croloy 7	(7% Cr, ½% Mo)
Croloy 9-M	(9% Cr, 1% Mo)
Croloy 18-8-S	(18% Cr, 8% Ni)
Croloy 16-13-3	(16% Cr, 13% Ni, 3% Mo)
Croloy 25-20	(25% Cr, 20% Ni)

Ask your B&W Tube Representative for detailed technical and application data on any analyses you may require.

THE BABCOCK & WILCOX TUBE COMPANY

General Offices: Beaver Falls, Pa.

Plants: Alliance, Ohio, and Beaver Falls, Pa.

Sales Offices: Alliance, Ohio • Beaver Falls, Pa. • Boston 16, Mass.
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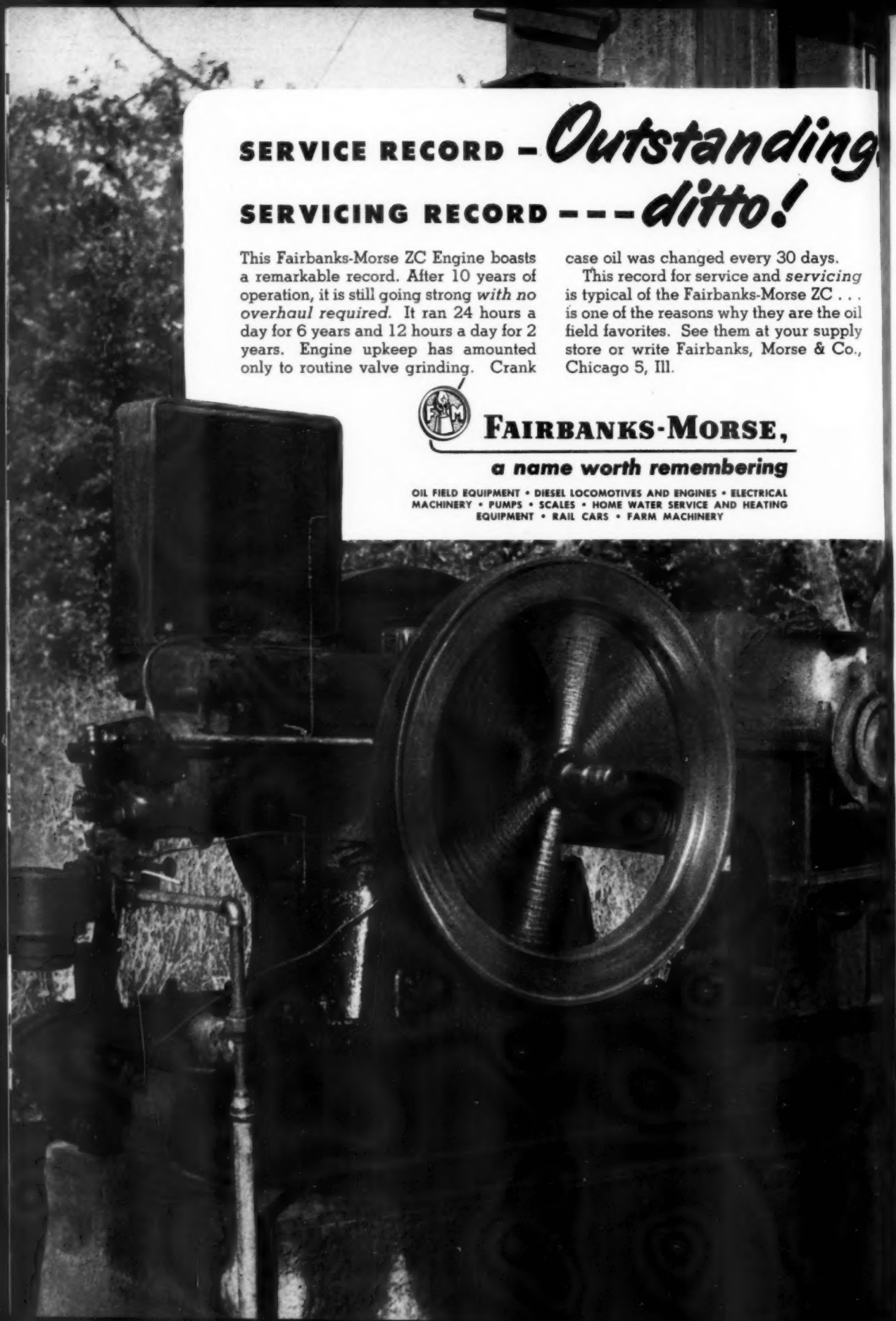
B&W SEAMLESS and WELDED TUBES

TA-1593-S



SERVICE RECORD – *Outstanding*

SERVICING RECORD – – – *ditto!*

This Fairbanks-Morse ZC Engine boasts a remarkable record. After 10 years of operation, it is still going strong *with no overhaul required.* It ran 24 hours a day for 6 years and 12 hours a day for 2 years. Engine upkeep has amounted only to routine valve grinding. Crank case oil was changed every 30 days.

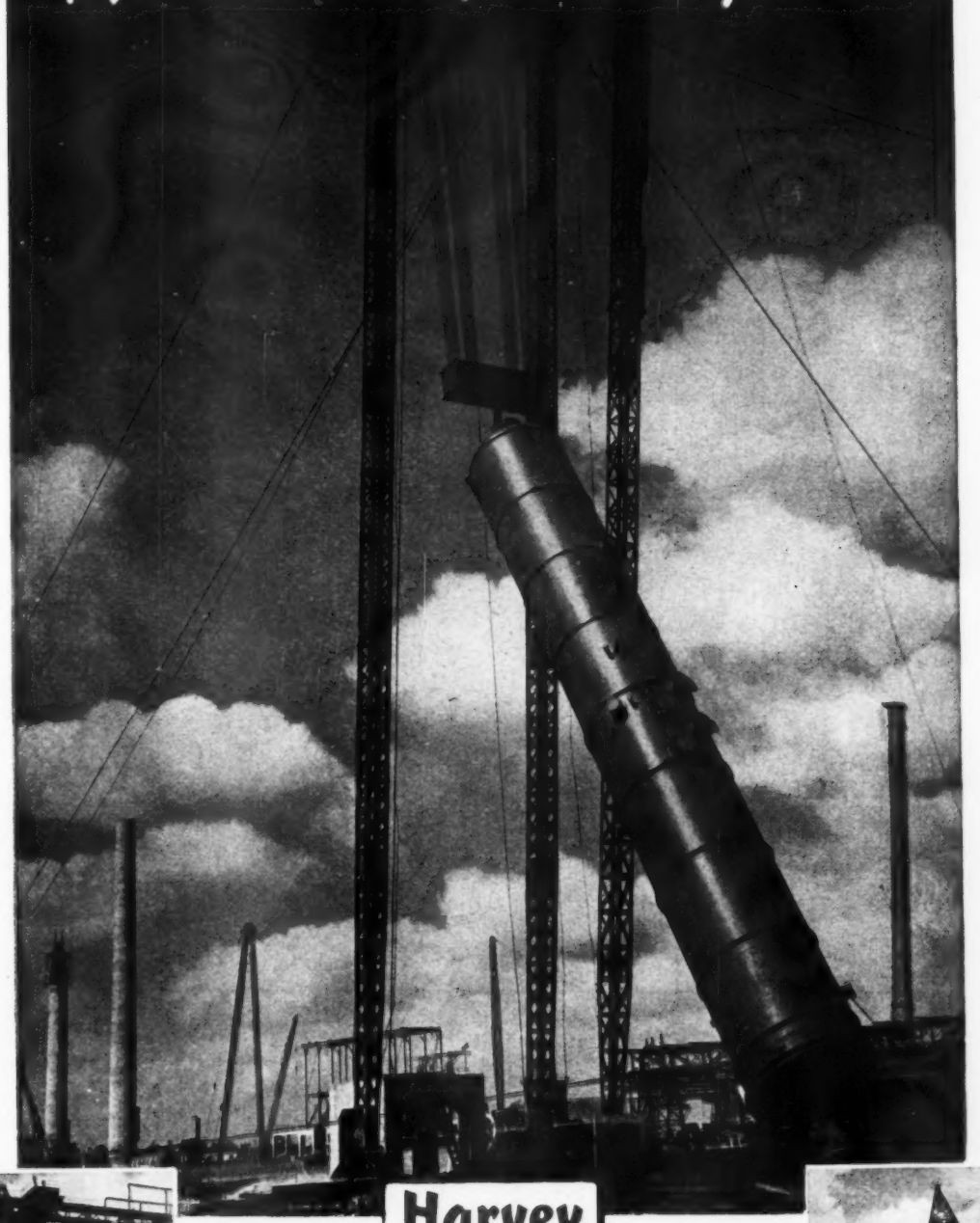
This record for service and *servicing* is typical of the Fairbanks-Morse ZC . . . is one of the reasons why they are the oil field favorites. See them at your supply store or write Fairbanks, Morse & Co., Chicago 5, Ill.

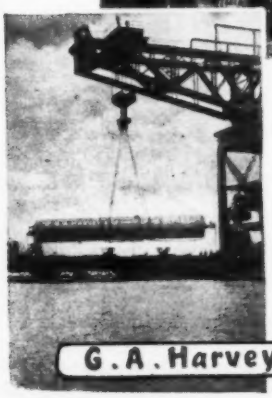
FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE AND HEATING EQUIPMENT • RAIL CARS • FARM MACHINERY

up goes another Harvey Fractionating Column !

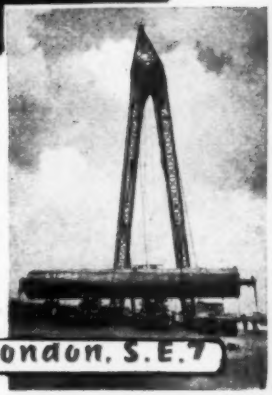




Harvey

This Column, fabricated by Harveys, was lowered into the Thames near their London works, towed across the North Sea, lifted from the water at Pernis, near Rotterdam, and soon became an active part of the Royal Dutch Shell Group's New Oil Refinery. Harveys undertake all forms of heavy constructional work for the Oil and many other Industries.

Send for Catalogue OG 750



G.A. Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.

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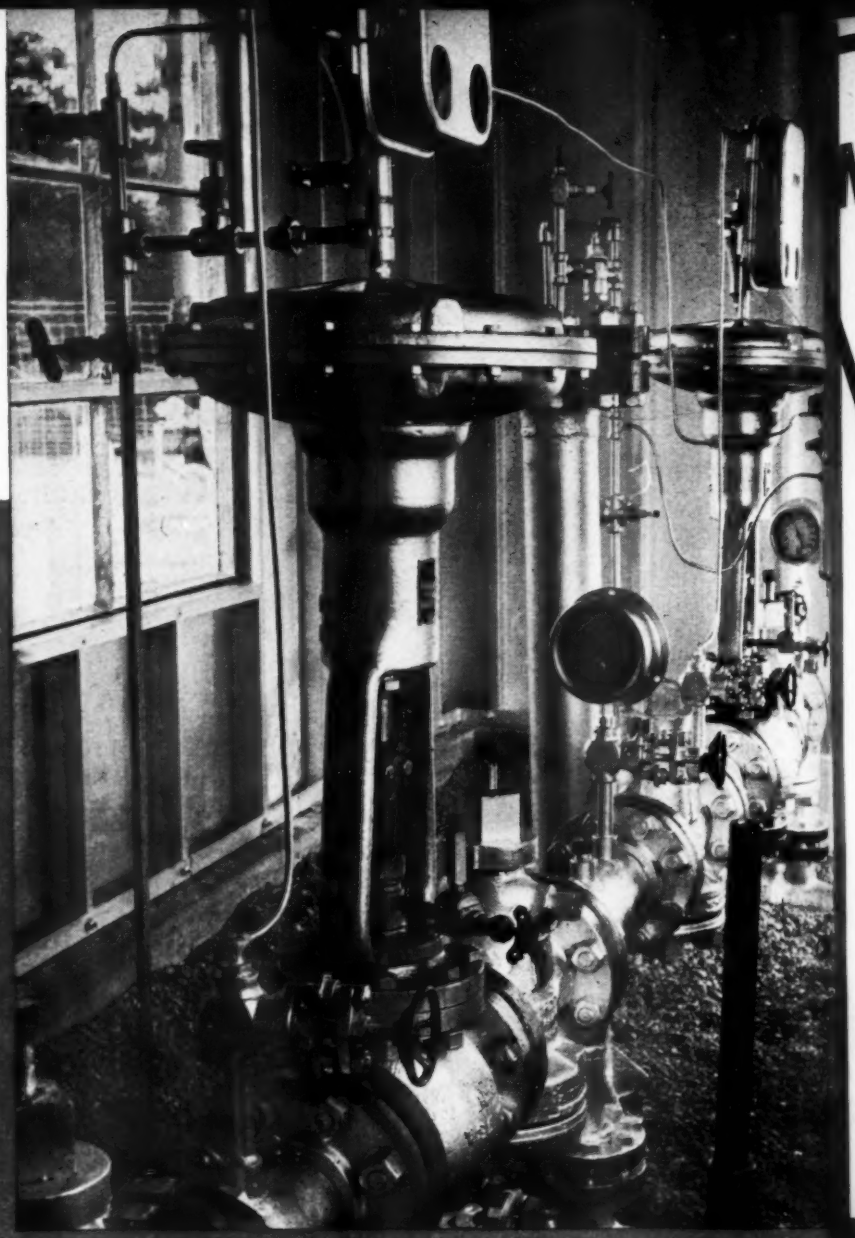
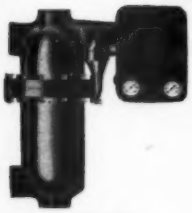
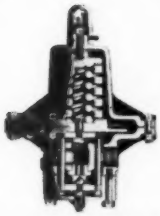


DIAPHRAGM
CONTROL VALVES



LIQUID
LEVEL CONTROLS

SELF-OPERATED
REGULATORS



SELF-CONTAINED
REGULATORS

Quick, Clear Solutions for Toughest Problems
...Available as a BS&B-Climax Service

Where Controls Must Carry On Alone ..You Can Count on BS&B Climax!

These are times when coddling is OUT. Production can't wait. Lines can't be held up. And certainly supervisory and repair men can't be spared to wet-nurse controls.

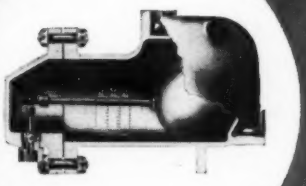
That's why you see more and more BS&B Climax Controls going into new installations... serving as replacements on old. Oil men count on Climax to deliver accurate, trouble-free performances... month after month, even on toughest locations. And when a check is necessary... when long service is rewarded with replacement parts ... you'll find Climax are easier, simpler to service.

Interchangeable parts, quick switches in the field, dual characteristics . . . why Climax saves hours and dollars every time the maintenance man calls around!

Aren't you about ready for some controls? Just call in your nearest BS&B Sales Engineer... learn for yourself how you can cut costs and boost efficiency with what you need from the BS&B Climax Control line!

Black, Sivalls & Bryson, Inc.
Climax Controls Division

Kansas City • Tulsa • Oklahoma City
Cable Address: BLACKSIV, New York



CONTINUOUS DRAINERS

... and scores of other job-proved, long-life controls for every need!

Your BS&B-Climax Man is unique in that he has both long experience in process control and a complete, balanced line of quality controls. He appreciates your need for speed and handles each assignment promptly. If there is an answer, your BS&B-Climax man can find it for you.

BLACK, SIVALLS & BRYSON, INC.
SALES PROMOTION DEPT.
Sec. C10-21-11 7500 East 12th St. Kansas City 3, Mo.

Please send BS&B-Climax Control information. I am particularly interested in _____

☐ Please have Sales Engineer call.

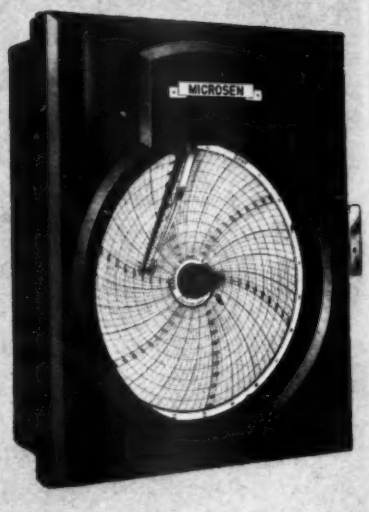
NAME _____
TITLE _____
FIRM _____
STREET _____
CITY _____ STATE _____

XUM

A NEW AND UNIQUE DEVELOPMENT IN THE PYROMETER FIELD...

MICROSEN

TEMPERATURE INDICATORS AND RECORDERS



Thermocouple actuated, Microsen Temperature Indicators and Recorders were designed to fill the need for a rugged, yet economical, type of electrical instrument capable of measuring temperature between minus 100° and plus 3000° F.

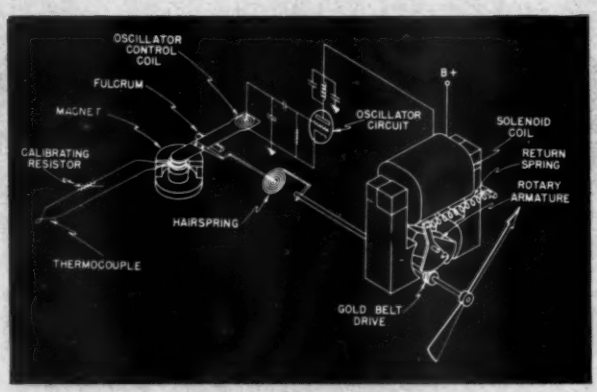
Power actuation and construction simplicity of these instruments supplant the delicate and fragile construction of millivolt pyrometers and eliminate the need for slidewires, standard cells, delicate moving contacts, or complicated mechanisms found in the more costly types of potentiometers.

Sensitive to low power input, the Microsen Balance assures precise performance in the measurement of temperature. Its characteristic rotary motion adapts it, particularly, to circular dial indication with consequent reduction of tendency to parallax error. A high torque rotary solenoid positions the pointer with "pin point" accuracy and allows the use of large indicating dials.

The Microsen Balance is enclosed in a sealed housing protecting all measuring elements from dust and corrosive vapors.

Thermocouple cold junction compensation is accomplished by a small, built-in, and heated chamber maintained at a constant temperature regardless of ambient temperature effects.

For complete details, write for Bulletin 404.



OPERATION OF MICROSEN BALANCE

The Microsen Balance is designed to maintain equilibrium between two forces, one proportionate to thermocouple emf, the second being dependent on pointer position.

A change in the thermocouple input causes a deflection of the Microsen beam. The change in proximity of the flag end of the beam to the oscillator coil detunes the oscillator circuit, causing a current change through the vacuum tube and the solenoid coil.

The solenoid armature rotates to position the pointer so that the hairspring torque is opposed and equal to the input torque. The mechanical indication is then being weighed in exact proportion to thermocouple input.

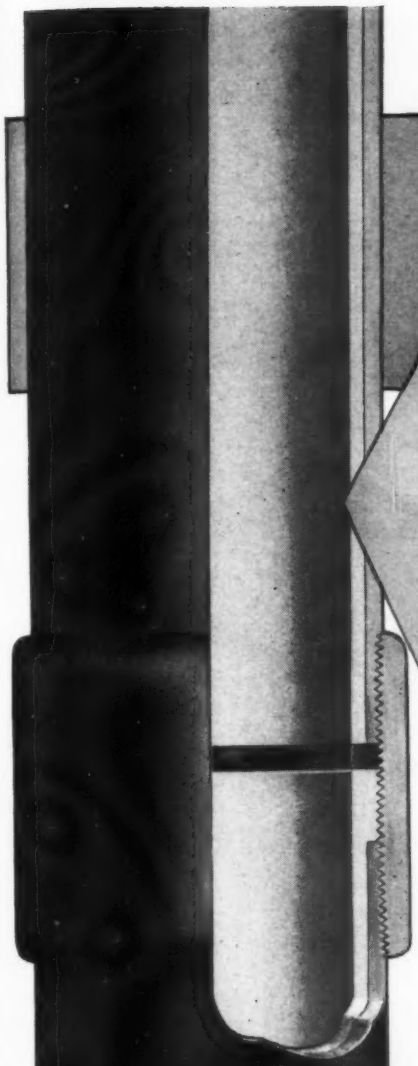
MICROSEN ELECTRICAL INSTRUMENTS

A Product of

MANNING, MAXWELL & MOORE, INC.

STRATFORD • CONNECTICUT

Makers of 'Microsen' Electrical and 'American' Industrial Instruments, 'Hancock' Valves, 'Ashcroft' Gauges, 'Consolidated' Safety and Relief Valves. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties.



STOP Costly Corrosion with J&L Cement Lined Steel Pipe

- Handles all mildly corrosive liquids economically.
- Unaffected by atmospheric temperature changes.
- Withstands high working pressures.
- Easy to install—no special tools or fitters required.
- Available through any of our 105 conveniently located Sales Points.

Here is the pipe to handle mildly corrosive liquids economically. J&L Cement Lined steel pipe costs little more than regular pipe and a lot less than glass, non-ferrous or special alloy pipe. The increase in cost over ordinary pipe is more than made up by longer life, reduced maintenance, and greater safety.

Installation of J&L Cement Lined steel pipe can be handled by your regular crews. No special tools are required. A complete line of nipples, fittings and couplings — all lined with the same exclusive J&L Cement — are available. The pipe can be dismantled and reassembled.

If you are troubled by the high cost of piping salt water, diluted acid or other corrosive liquids, see your nearest Jones & Laughlin Supply store. It will take just a moment for you to see how J&L Cement Lined steel pipe can stop costly corrosion.

Member Petroleum Equipment Suppliers Association

80 Stores
17 District Sales Offices
8 Resident Salesmen

"... here's MY warehouse!"

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation
TULSA, OKLAHOMA

J&L STEEL

DOES YOUR POWER STACK UP WITH LCP* FOR *Flexibility?*

MORE and MORE WELLS ARE PUMPED BY *LCP EVERY DAY!

I'm a FLEXIBLE fellow! I can take on a full 24-hour shift or work according to any fractional time schedule! You pay only for the power required to get the job done! My FLEXIBILITY —plus automatic control, lower first cost, and lower upkeep stack up in my favor! The Power Engineer of your Utility Electric Power Company has proof of my performance—give him a call today!

*LOW COST POWER

PETROLEUM ELECTRIC POWER ASSOCIATION

Well Driller Reports:

16 wells drilled— 120,000 feet of hole—

with ONE length of Goodyear Style 3153-H Rotary Hose

THIS prominent southwestern driller used a single length of Goodyear's Style 3153-H Rotary Drilling Hose to sink sixteen wells over a 33-month period — far better service than he averaged with previously-used hoses.

Explanation for this outstanding service is that Style 3153-H Rotary Hose is designed by the G.T.M.—Goodyear Technical Man — to do a specific job longer, better, at lower cost in the long run. For this same kind of service in flat belts, V-belts, hose, molded goods, and all industrial rubber products, get in touch with your nearest Goodyear Industrial Rubber Products Distributor, or write Goodyear, Akron 16, Ohio.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified STREAMLINED INTEGRAL COUPLING FOR ROTARY HOSE
A—Threaded fitting draws assembly tight for positive closure
B—Smooth outer cover can't catch on rig
C—Soft, live-rubber sealing ring prevents leaks at pressures up to 5,000 lbs.
D—Integral flanged end provides full flow without need for enlarged ends, outside clamps or bands
E—Built-in wire reinforcement in hose end further strengthens fitting
FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER

XUM

Light Duty or Heavy Duty

Type GA Rotary Pump: Up to 50 gpm and 100 psi.

Type GR Rotary Pump: Up to 5000 gpm and 500 psi.

Double Helical Herringbone Gear Rotors: Quiet and efficient; extra large wearing surfaces; no axial thrust; no trapping of liquid.

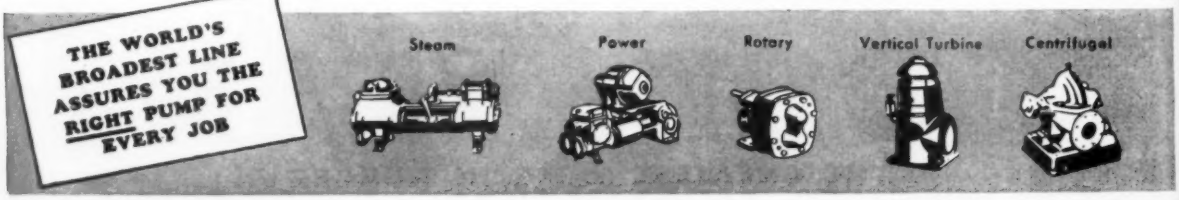
. . . You Get The Same Sturdy Construction!

For light duty pumping of hot or cold, thin or viscous liquids, use the Type GA . . . for heavy duty, hook up its big brother, the Type GR. Either way you're sure of the ruggedest construction and smoothest performance it's possible to build into a rotary pump. That's because both these hard working huskies incorporate the special herringbone rotors that operate so quietly and efficiently . . . combining with the whole advanced Worthington design for long, trouble-free, money-saving service. Get the whole story that proves *there's more worth in Worthington.* Write, describing your requirements to *Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.*

WORTHINGTON

P-0-2

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB



tests prove you can STOP CORROSION with SANTOLENE C

If corrosion in pipelines, tanks and equipment handling light petroleum products is one of *your* problems, you can solve it with Monsanto Santolene C.

Static storage experiments with both gasoline and fuel oil show results that are *positive proof* that Santolene C stops corrosion. Static storage is a severe test of a corrosion inhibitor such as Santolene C.

Fuel Oil, containing as little as 100 parts per million of Santolene C, stored in steel drums for months, left the containers free of corrosion . . . free of pitting. Drums, without Santolene C, holding fuel oil from the same lot and stored under identical conditions for the same period, were badly pitted by corrosion.

Gasoline, with as little as 20 parts per million of Santolene C, left steel drums smooth and bright after months of storage. The same kind of drums, holding identical gasoline without Santolene C, were badly damaged by corrosion.

Put Santolene C in your gasoline and fuel oil and take out the corrosion problem. Monsanto Santolene C stops corrosion . . . quickly . . . positively . . . economically. For information, mail the coupon or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1745-L South Second Street, St. Louis 4, Mo.

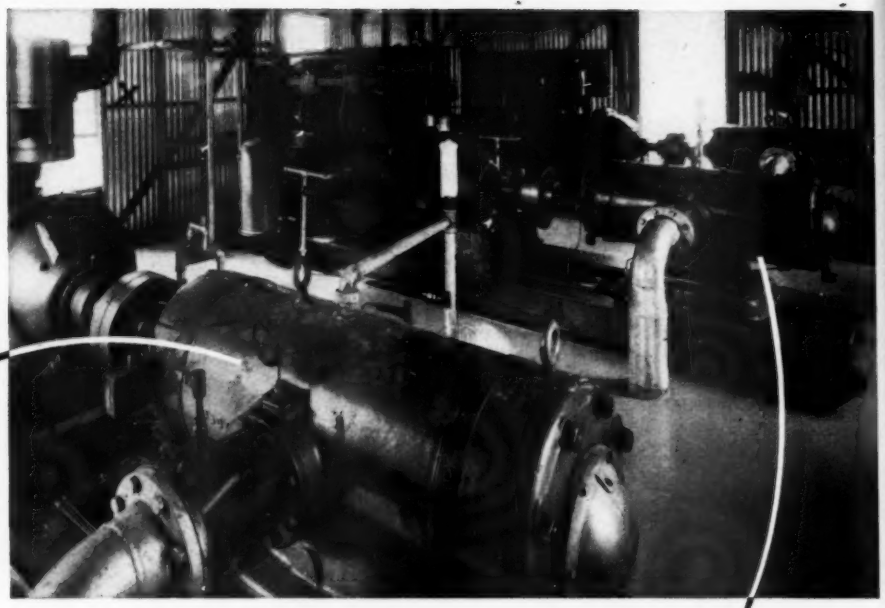
Santolene: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
1745-L South Second Street, St. Louis 4, Missouri

Please send: . . . . Information on Santolene C; . . . . Representative to discuss our problem of corrosion in . . . . . used for . . . . . *Name* . . . . . *Title* . . . . . *Company* . . . . . *Street* . . . . . *City* . . . . . *Zone* . . . . . *State* . . . . .

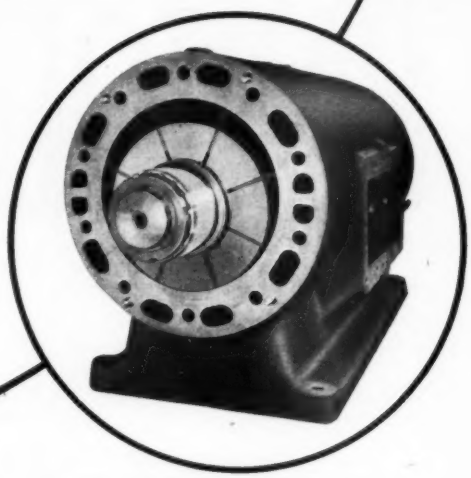
SERVING INDUSTRY . . . WHICH SERVES MANKIND



Three Fuller Rotary Single-stage Natural-Gas Boosters, each machine boosting 1,430,000 cu.ft./24 hours, from 5-lb. gage to 25-lb. gage.

JOHNNY ON THE SPOT . . . AND ALWAYS ON THE JOB

PRESSURES TO 125 psi.
CAPACITIES TO 3000 cfm.



Fuller Rotary Compressors are about the most faithful workers you can put on your payroll. You can spot them where you need them along your gathering lines . . . and always be sure they'll be on the job day after day, week after week.

Fuller Rotary Compressors are built to be dependable and economical in operation. They have but few moving parts . . . the rotor, bearings and blades. That means infrequent inspection, and minimum maintenance. Because blades automatically compensate for wear, full capacity is maintained for the life of the machine. Every detail in Fuller Compressors is engineered for one purpose . . . to give a life-time of new machine efficiency.

Fuller engineers will be glad to work with you for the proper application of Fuller Compressors to gathering lines or general booster requirements. You'll be taking a long step toward more economical, efficient operation if you call them in today . . . or write for Bulletin C-5, describing and illustrating in detail Fuller Rotary Compressors.

FULLER COMPANY
Catasauqua, Pa.

120 S. LaSalle St.
Chicago 3

420 Chancery Bldg.
San Francisco 4

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

fuller

C-202

28 refinery tested analyses

to meet your specific piping problems

Here are

Low Carbon
Low Carbon, ½ Mo
Low Carbon, 1 Mo
½ Cr, ½ Mo
1 Cr, ½ Mo
1-¼ Cr, ½ Mo
2 Cr, ½ Mo
2 Cr, ½ Mo, 1-¼ Si
2-¼ Cr, 1 Mo
2-½ Cr, ½ Mo, ¾ Si
3 Cr, ½ Mo, 1-¼ Si
3 Cr, 1 Mo
5 Cr, ½ Mo
5 Cr, ½ Mo, 1-½ Si
5 Cr, ½ Mo, Ti
7 Cr, ½ Mo
8 Cr, ½ Mo
8 Cr, 1 Mo
9 Cr, ½ Mo
9 Cr, 1 Mo
12 Cr, Al
17 Cr
27 Cr
18-8
18-8 Ti
18-8 Cb
18-8 Mo
25-20

NO matter how unusual your pipe or tube problem, there's a good chance that one of our 28 analyses will solve it. But the important thing to remember is this: each of these analyses was developed to overcome actual conditions of corrosion, oxidation, temperature, pressure, and exposure. In addition, each of these analyses has been thoroughly tested in refinery service. As a result of these installations, we've found out exactly what each will do. And we discovered something else, too: it takes a lot of experience before any one analysis can be recommended as the best and most economical pipe or tube for any particular job.

We've got that experience. Because National Tube Company — world's largest manufacturers of seamless tubular products—has spent over 60 years building up a file of authentic case histories. The endless miles of National Seamless Pipe and Tubes *now in use* have given us a first-hand opportunity to observe the actual performance of refinery tubes under some of the most trying operating conditions known to the industry.

But there's more to refinery tubes than steel analyses. The mechanical strength of the tube is vitally important—and you can't beat seamless tubes for strength. All National refinery pipe and tubes are seamless. They're pierced from billets of high quality steel. This method of manufacture—one of the most drastic forging operations in the industry—assures you of tubes that have absolutely uniform wall strength.

So remember, if you want the best results from your tubes, at the lowest possible cost, submit your problems to our engineers *before* you select new tube requirements. Our huge file of case histories . . . the experience of our engineers . . . are at your service. For more information, write National Tube Company, Frick Building, Pittsburgh 19, Pa.

WALLS WITHOUT WELDS

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
(Tubing Specialties Division)
COLUMBIA STEEL COMPANY, SAN FRANCISCO
PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

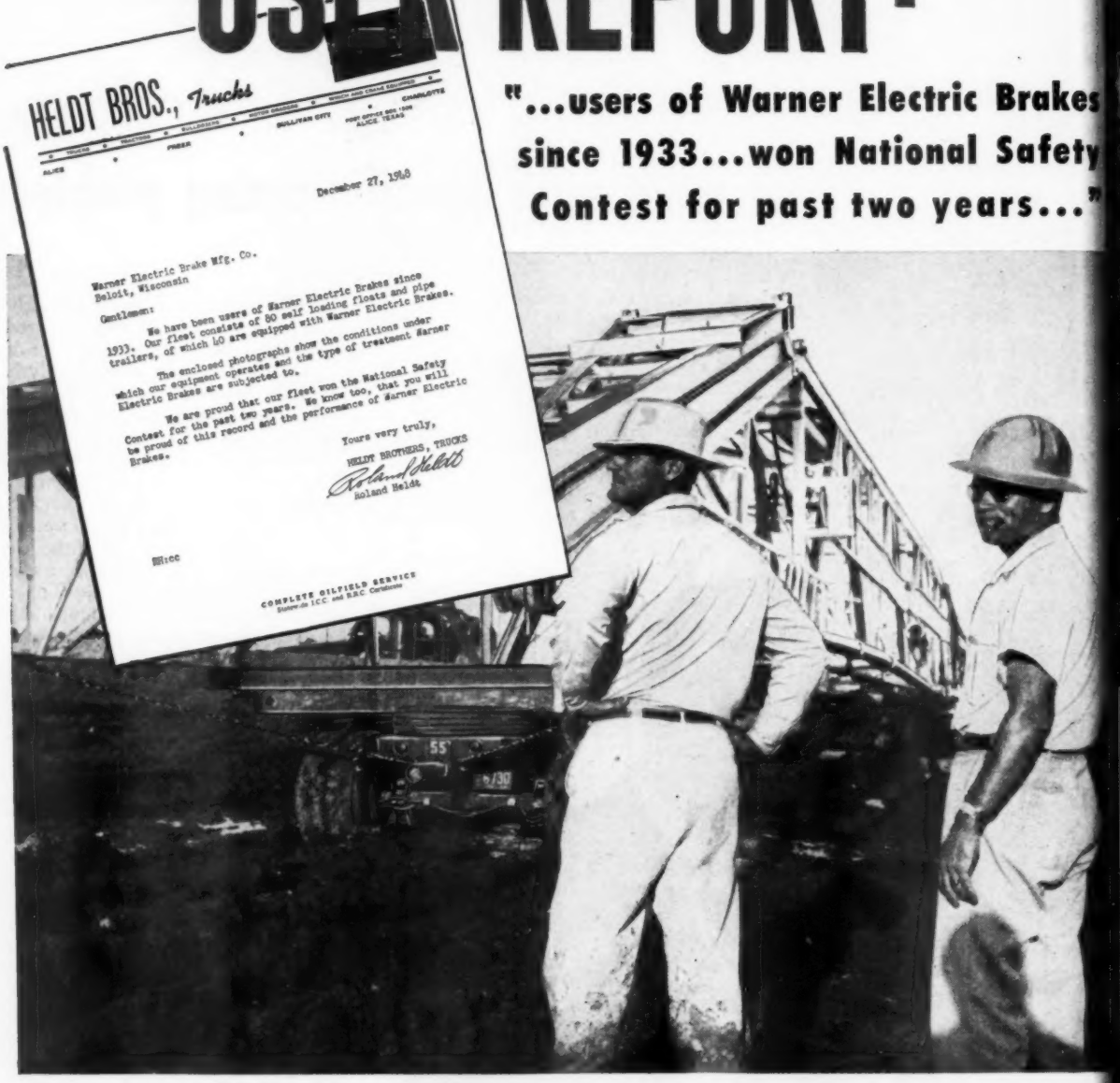
NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL

XUM

USER REPORT:

"...users of Warner Electric Brakes since 1933...won National Safety Contest for past two years..."

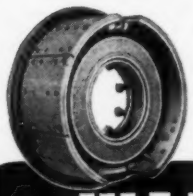

HELDT BROS., Trucks
ALICE
PAMPA
SWEETWATER
MOTOR GRADERS
SHOVELS AND CRANE EQUIPMENT
POST OFFICE BOX 1508
ALICE, TEXAS
December 27, 1948
Warner Electric Brake Mfg. Co.
Beloit, Wisconsin
Gentlemen:
We have been users of Warner Electric Brakes since 1933. Our fleet consists of 80 self loading floats and pipe trailers, of which 40 are equipped with Warner Electric Brakes.
The enclosed photographs show the conditions under which our equipment operates and the type of treatment Warner Electric Brakes are subjected to.
We are proud that our fleet won the National Safety Contest for the past two years. We know too, that you will be proud of this record and the performance of Warner Electric Brakes.
Yours very truly,
HELDT BROTHERS, TRUCKS
Roland Heldt
Roland Heldt
Bliss
COMPLETE OILFIELD SERVICE
Member ICC and RAC Certificate

LOOK at that muck and mire! That's the stuff that's sheer murder on men and machines — the stuff you've got to expect when you go after oil — because oil is where you find it. Just ask the Heldt Bros., who specialize in going where oil is — and roads just ain't. That means, too, that trailer brakes must withstand every kind of severe weather and road condition. So take a tip from Heldt Bros. — get Warner Electric Brakes.

Warner Electric Brakes give lightning-fast action with an infinite degree of braking control, plus low-cost installation and maintenance. There's full clearance under the tractor and trailer — nothing to get knocked off or leak — no exposed braking equipment — no rods to rattle — no tubing to split — only simple wiring to each wheel.

For full information see your nearest Warner Electric Brake dealer — or write:

WARNER ELECTRIC BRAKE & CLUTCH COMPANY
BELOIT, WISCONSIN



Revolutionary!
Warner Electric Brakes of 2-shoe construction in sizes 16½" x 5", 16½" x 6", and 16½" x 7". A really new concept of super-stopping power. Ask about them.

WARNER
THE ORIGINAL AND PROVEN
ELECTRIC BRA

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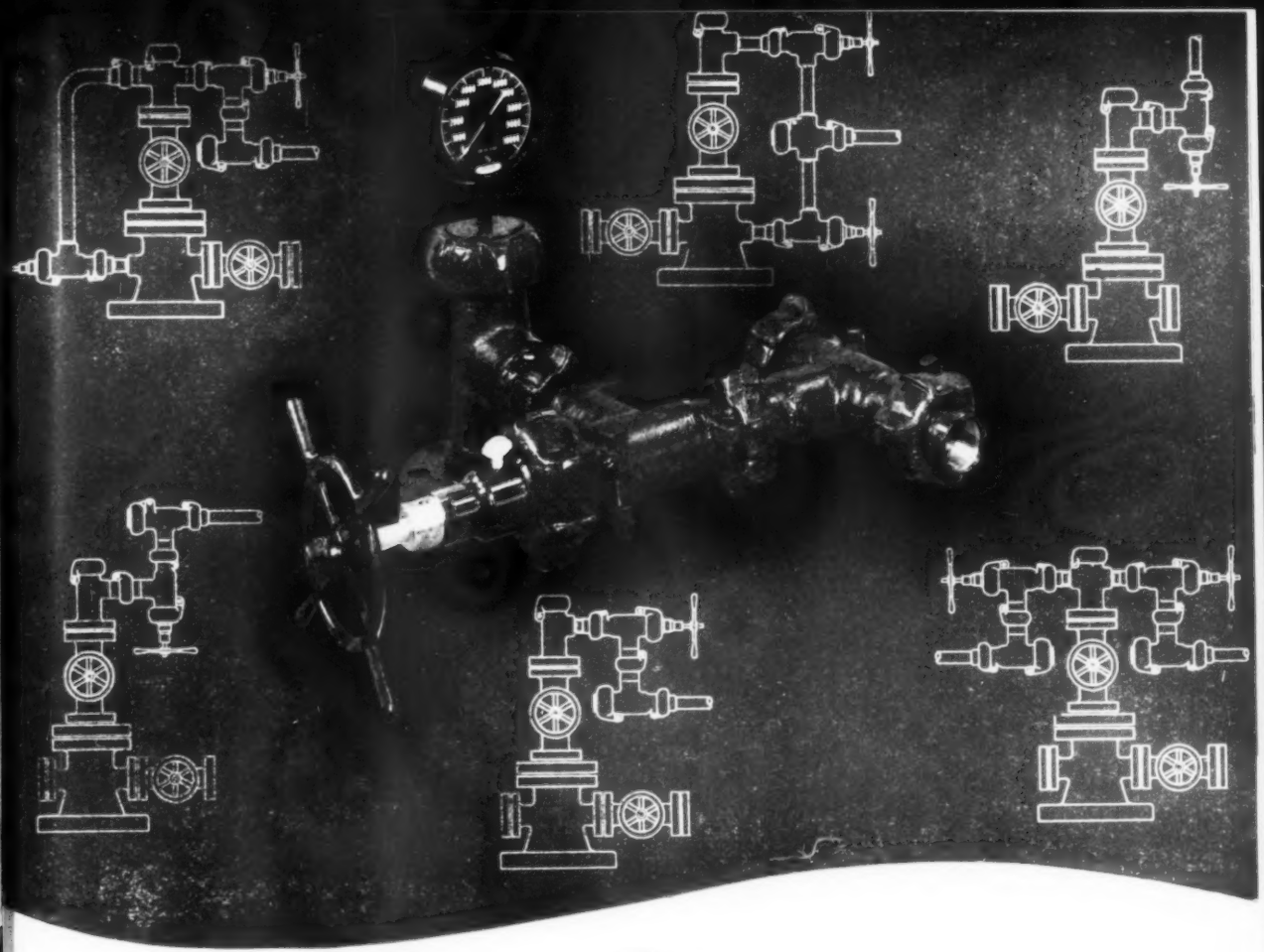

UNIBOLT *Flow Manifolds* make any tree stronger, lighter, more economical . . . better!

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Manifold is many pounds lighter, yet the unique UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

Here are other reasons why more and more operators are specifying UNIBOLT Flow Manifolds for their Christmas trees: (1) Units of the manifold . . . Unibolt Adjustable Wing Valve, Unibolt Positive Choke Body, and Unibolt Tee or Cross . . . are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual requirements; (2) Any desired volume of well flow may be accurately achieved with UNIBOLT Flow-Rated Beans, which are available in flow increments of 5% and 10%, or in standard fractionally drilled sizes; (3) Lower first cost and maintenance; (4) All parts may be safely and easily replaced in the field; (5) Its units are completely interchangeable; (6) The manifold is completely salvageable; (7) It is available in regular forged steel or in high-chrome alloy for corrosive wells — 6,000 lbs., 10,000 lbs., and 15,000 lbs. test.

THORNHILL-CRAVER CO.

HOUSTON, TEXAS

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long-stroke pumping that's easy on the GAS supply

Save gas, save money . . . handle long-stroke pumping of suitable wells with an "Ideal" Type E Plunger Lift, regulated by the improved "Ideal-Taylor" Type C Cycle Controller.

You get these four big advantages . . .

Can be installed without pulling tubing in most cases . . . the "Ideal" Type E Plunger Lift operates in standard API tubing.

Save gas and maintain gas pressure...the flow line is properly and fully closed after each plunger trip by the cam-operated pilot valve on the stack nipple.

The entire operation is controlled simply, precisely, entirely by controls at the well-head.

"Ideal" Plunger Lifts are backed up by 20 years of development and experience, by hundreds of satisfactory installations.

Write for bulletins describing the "Ideal" Type E Plunger Lift and its controls. Our engineers will gladly discuss the solution of your long-stroke pumping problems, advise you on the "Ideal" equipment to do the job best, at least cost.

THE NATIONAL SUPPLY COMPANY

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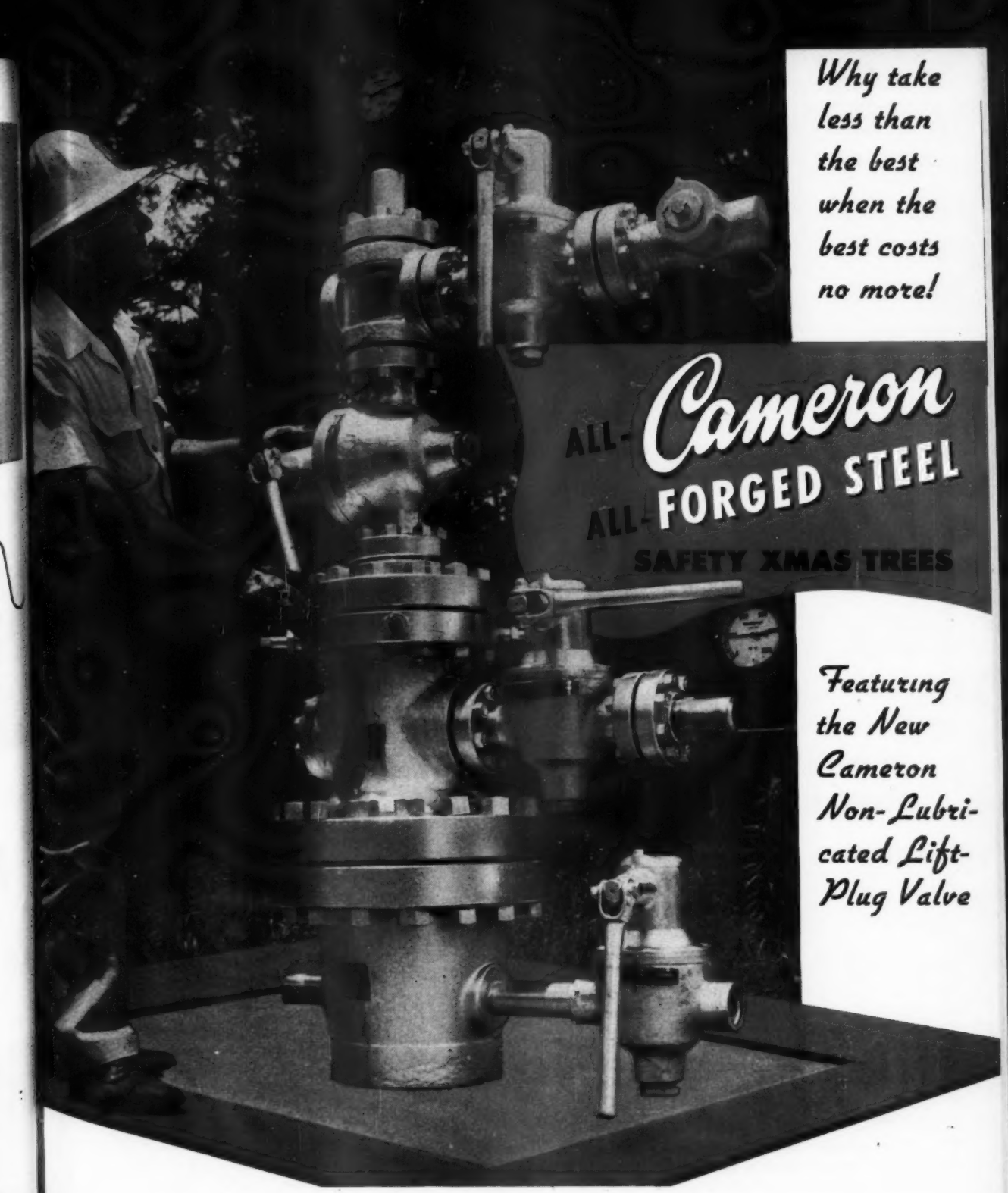
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT... SPANG PIPE... SUPERIOR & ATLAS ENGINES



Why take less than the best when the best costs no more!

ALL-Cameron ALL-FORGED STEEL SAFETY XMAS TREES

Featuring the New Cameron Non-Lubricated Lift-Plug Valve

Instead of assembling several different makes of valves, chokes and fittings in a Christmas tree manifold, thus dividing the responsibility of proper functioning and servicing of the various units among a number of manufacturers, many operators have welcomed the idea of the all-Cameron Christmas tree.

Furthermore, Cameron offers the operator the widest selection of well completion equipment, including various types of casing hangers, numerous methods of tubing suspension, both ram type and lock-screw type tubing heads, non-lubricated lift-plug valves, integrated flow wings, convertible positive-adjustable chokes, and all types of fittings.

Perhaps the most desirable feature of Cameron Christmas trees is the fact that they are available in forged alloy steel . . . from top to bottom . . . at no increase in price.

Your Cameron representative will gladly consult with you on your particular Christmas tree requirements.

CAMERON IRON WORKS, INC.
P. O. Box 1212 **Houston, Texas**
EXPORT — 74 TRINITY PLACE, NEW YORK CITY

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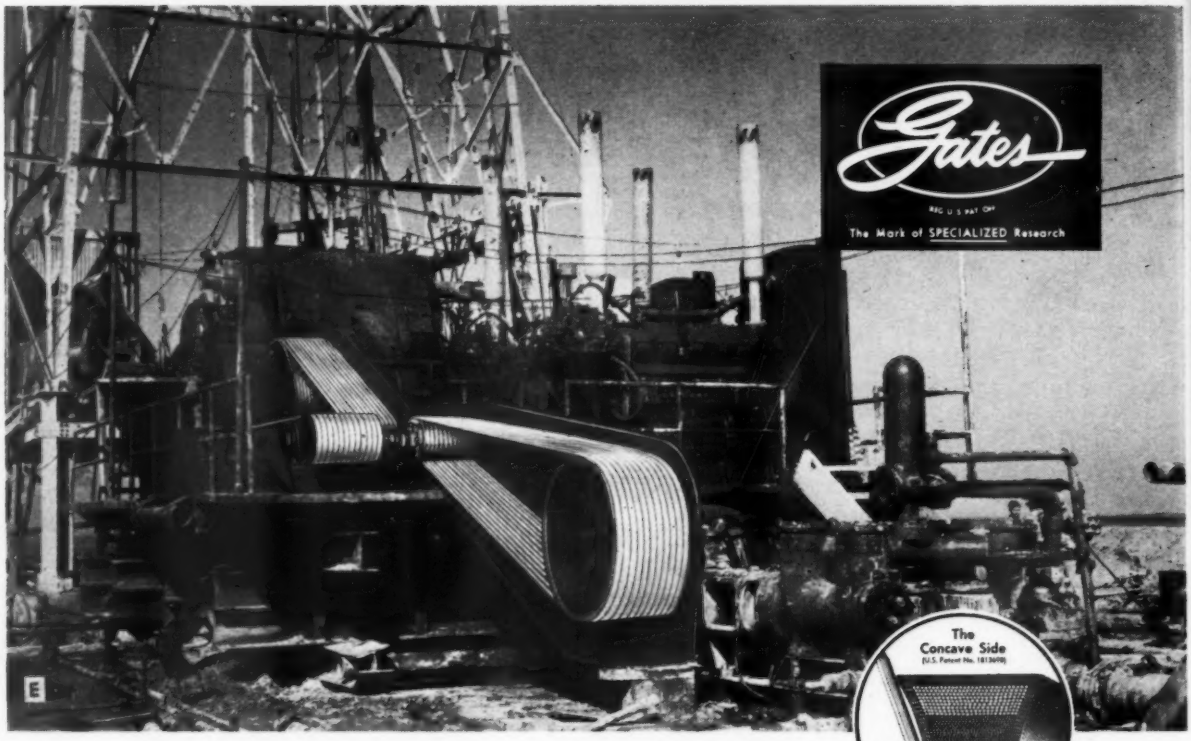


A drive failure on this big mechanical rig, drilling a wildcat well 30 miles from a drillers supply house, would mean an expensive shut-down and delay for replacements. So Loffland Brothers, the operators, used multiple Gates Vulco Rope Drives to insure against breakdown delays. John Rundle, Tool Pusher, says: "Now that some of the drives have carried us through the drilling of seven wells of over 6,500 feet, we know that long life is still another Gates Vulco Rope advantage!"

If you want LOWER V-BELT COSTS, just make this simple test!

Just pick up *any* V-Belt and bend it—exactly as it bends when going around its pulley—and *see what happens!*

The top of the belt is put under tension; hence it grows *narrower.* The body the belt is under compression and *bulges out.*

This change of shape, due to bending a *straight-sided* V-Belt, is shown in figures 1 and 1-A. Note how the bulging sides are forced to press *unevenly* against the V-pulley. This naturally causes uneven wear on the sides—*concentrated wear* where the bulge is greatest.

Now look at figures 2 and 2-A. There you see how the bending changes the shape of the V-Belt that is built with the Concave Side—the Gates Vulco Rope. The precisely engineered concave side of this belt merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove.*

Because there is *no bulging,* the sides of the Gates Vulco Rope always press *evenly* against the V-pulley and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5011

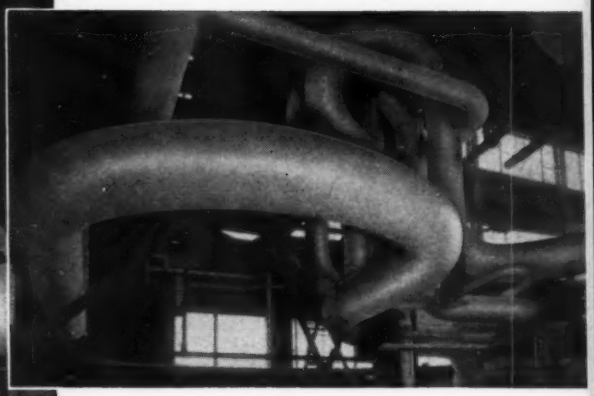
GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY

DENVER, U.S.A.

The World's Largest Makers of V-Belts

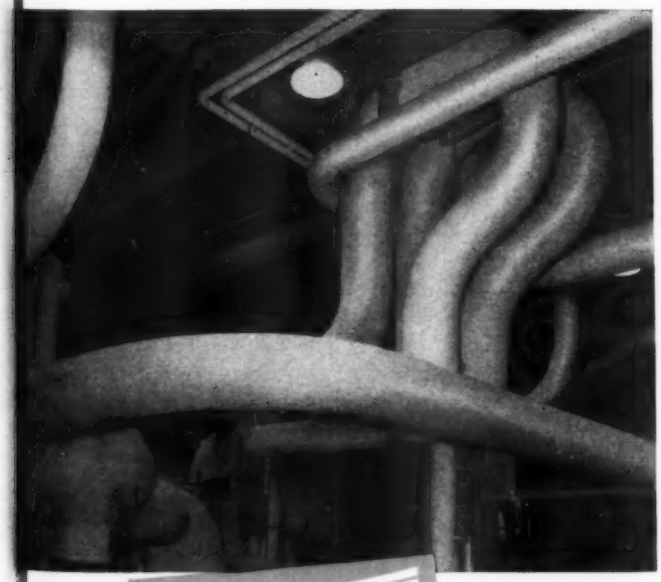


PIPING by MIDWEST

ANOTHER "First"

NEW SCHILLER STATION

First Complete Mercury-Unit Power Plant



The first installation of a mercury-unit power plant designed and built as a complete power generating unit . . . the Schiller Station of the Public Service Co. of New Hampshire at Portsmouth, N. H. is a notable achievement. When operating at designed rating of 40,000 kw and using Bunker C fuel oil, the heat rate is 9200 Btu per net kwhr.

The piping is by Midwest . . . fabricated and erected with undivided responsibility. "Firsts" are frequent with Midwest . . . have been throughout our more than four decades of experience with piping of all kinds. Midwest has grown up with modern high pressure and high temperature piping . . . through the years has achieved a wide reputation for better piping.

Whether you want a simple pipe bend, a series of complex prefabricated subassemblies, or a difficult piping job completely erected, Midwest has the facilities, the experience and the organization to meet every requirement. You will find it to your advantage to call upon Midwest whenever you need piping.

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YES, IT'S TRUE WHAT THEY SAY ABOUT O-C-T

C-19 CASING HEADS

THE ONLY CASING HEAD THAT MEETS EVERY WELL COMPLETION CONDITION] *. . . with a single compact model!*

Every man on the drilling-production team has good reason for liking the O-C-T "C-19" Casing Head. O-C-T "C-19" Casing Heads eliminate open hole hazards because they provide a positive casing seal and suspension before blowout preventers are removed. When dropped through preventers, suspension and seal are automatically effected. In addition, load capacity is twice as great as conventional slip hangers . . . slips set evenly and bite evenly . . . no field welding is required . . . hazardous installation work in muddy and cramped celler space is reduced to a minimum and hours of valuable rig time is saved. Yes, it's true what they say *because no other casing head gives you O-C-T flexibility and safety.* Ask your O-C-T Representative for details.

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas

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Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Southall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 3091 Houston 1, Texas.

O-C-T PRODUCTS — *Dependable and available through more than 700 supply store locations.*

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of Single-Engine Airline Operation Just Completed by Midwest Airlines

Cessna
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...ALL IN CESSNA 190'S

The fast schedules and perfect safety record in 1,000,000 miles of flying says all that needs to be said about the efficiency of Midwest Airlines . . . and the performance of these remarkable, all-metal Cessna airplanes.

But here are two additional facts you should know:

1. These 4-5 place "airliners" are well within the reach of many companies, many individuals . . . offer airline speed and comfort, yet operating and maintenance costs are extremely *low!*

2. If your company's executives travel totals as little as 57,250 highway miles (50,000 air route miles) a year . . . flying 2 to 4 executives IN YOUR OWN CESSNA 190 CAN SAVE YOUR COMPANY UP TO TWENTY 40-HOUR MAN-WEEKS IN TRAVELTIME EACH YEAR.

Your Cessna Dealer is prepared to prove this . . . to show you exactly what a Cessna 190 will do for *your* business. See him today!

ALSO SEE: The Cessna 140—2 place. All-Metal. Fast—quiet—economical. Many business uses. Saves weeks of traveltime. **The Cessna 170**—lowest-priced, 4-place, all-metal plane on market . . . by several thousand dollars.

MAIL THIS COUPON OR SEE YOUR NEAREST CESSNA DEALER

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Please send free literature giving complete description of the Cessna 140 ( ); Cessna 170 ( ); Cessna 190 Series ( ); Literature for model builders ( ).

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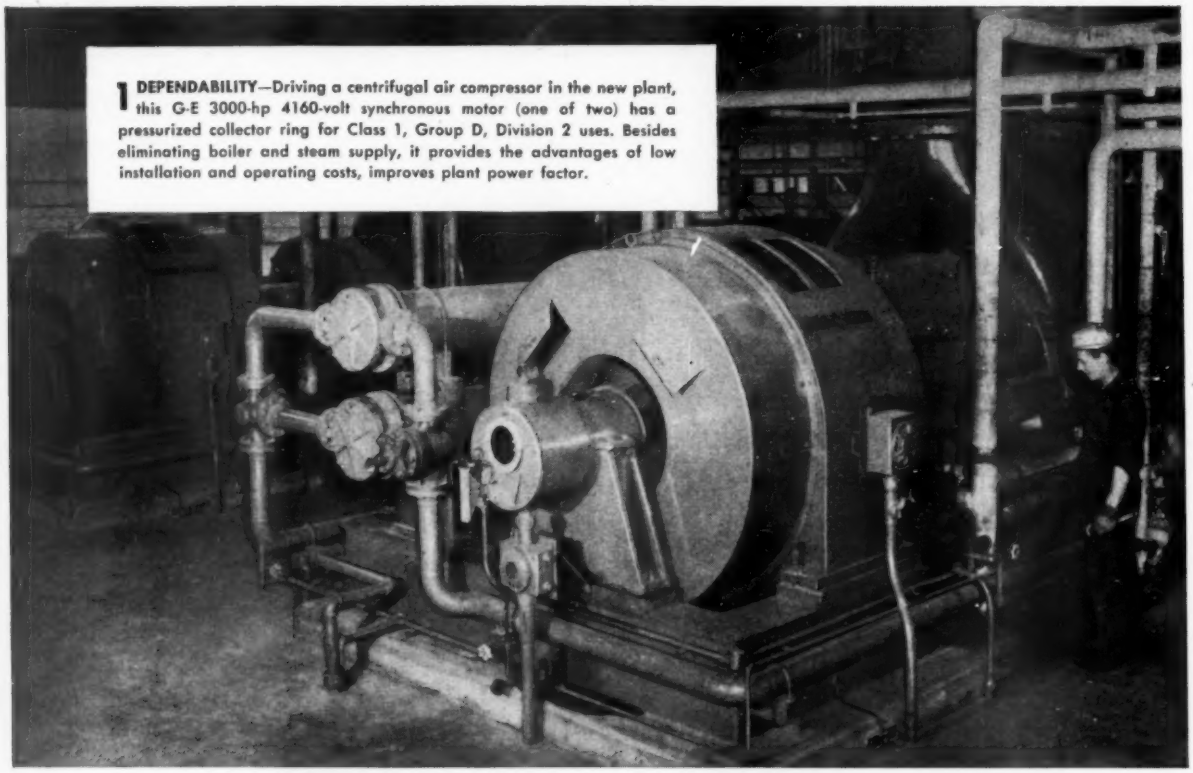


1 DEPENDABILITY—Driving a centrifugal air compressor in the new plant, this G-E 3000-hp 4160-volt synchronous motor (one of two) has a pressurized collector ring for Class 1, Group D, Division 2 uses. Besides eliminating boiler and steam supply, it provides the advantages of low installation and operating costs, improves plant power factor.

Cat Cracker cracks down on shutdowns with G-E drives!

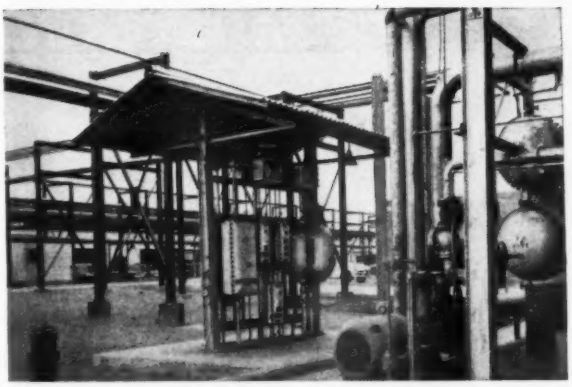
Sohio's new $11,000,000 fluid catalytic cracking plant at Lima refinery goes on stream—with co-ordinated G-E equipment helping to maintain continuous, 16,000-bbl-per-day rate!

Fluid catalytic cracking—operating as it does on a continuous basis—just can't afford shutdowns of motor-driven equipment. That's why, at Sohio's new Lima plant, the natural choice was G-E motors and control. Carefully co-ordinated to work together and stay on the job, they minimize costly plant downtime, help keep output continuous!

Whatever your process needs, G.E. can match them from the most complete line of electric equipment made for refinery service, with G-E engineers to help apply it most economically. Ask your nearest G-E office about it—*early* in your planning. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

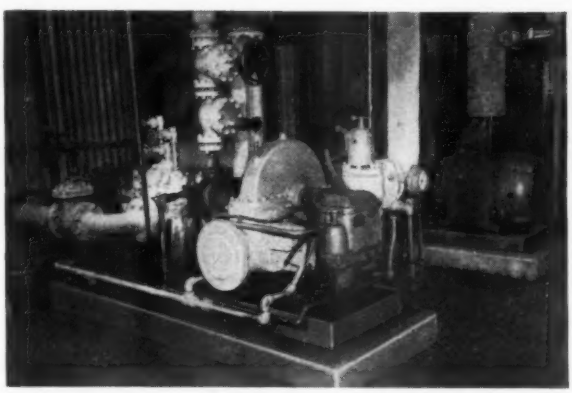
GENERAL ELECTRIC

661-23

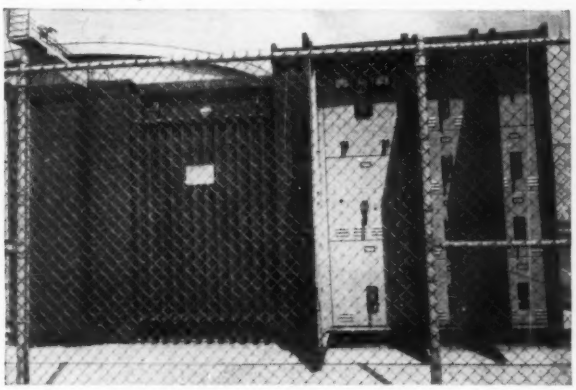


2 CONVENIENCE—A practical way to install low-voltage control in hazardous areas is to rack up an assembly of G-E combination starters and breakers, as shown here, for indoor or outdoor refinery use. They can be located close to the motors, as in this Class 1, Group D application at Sohio's new catalytic cracking plant.

3 JOB-RIGHT—Here, 7 of 14 G-E 100-hp vertical motors drive pumps that recirculate cooling-tower water. Both the motors and the G-E push-buttons mounted behind the middle motor are explosion-proof for Class 1, Group D use. G-E control for hazardous areas includes both air-break and oil-immersed types to match all G-E explosion-proof motors.



4 SELF-PROTECTED—In the pump house, this G-E Type DP mechanical drive turbine provides reliable adjustable-speed drive. Completely interchangeable spare parts plus new, standard pressure-lubrication system make these units—which operate anywhere in damp, hot, or hazardous areas—ideal for your toughest refinery applications.



5 LOW-COST POWER—In the new plant's tank field, a non-hazardous location, this G-E 750-kva outdoor load-center unit substation steps down 4160-volt power to 480 volts for use right where it's needed. These easily installed G-E units eliminate voltage drop for higher operating efficiency, cut power losses, provide flexibility for growth.

6 CENTRALIZED CONTROL—Motors driving much of the equipment on Sohio's catalytic cracking unit are controlled from a non-hazardous area, in this case the switch house, containing G-E low-voltage switchgear (left) and G-E Cabinetrol (extreme right). Made in compact, standardized units, they provide maximum personnel safety and flexibility of arrangement.

Co-ordinated ELECTRIC EQUIPMENT for Fluid Catalytic Cracking

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Condensed from an eye-witness account: — "'If we succeed, we shall make half a million,' observed an oil-prince to me one evening. By this he meant that he was setting his snares for catching shrewd Bostonians and New Yorkers of the Wall-Street type. Sooner or later an agent of a strong company in the East finds himself being conducted on a personal tour of 'one of the best and steadiest wells on the creek.' An 'innocent by-stander' then observes — 'you see that tank, sir? It is 10 ft. deep, contains 800 barrels when filled, and is now half full. Well, sir, that was pumped in just eight days.' The agent then inquires the lowest cash-down price and purchases the property then and there. Little does he know that three days ago a purchase of 50 barrels of oil had been made from a neighbor, the same being conveyed on the sly into the tank. Also, he does not know that 70% consists of salt water which has settled to the bottom. The public has not learned (the fact being studiously concealed) that even the best wells give out in time — ordinarily in 18 months!"

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PETROLEUM RESERVOIR

They Say—

Equation Explanation

Sir:

I would appreciate your reconcilement of the formulas for the radial flow of gas in cubic feet per day, as expressed in page 316 of Dr. Calhoun's Engineering Fundamentals *(The Oil and Gas Journal, January 15, 1948, page 93)*, and in Equation 4, page 44, of Park J. Jones' Production Engineering *(The Oil and Gas Journal, March 10, 1945, page 71)*, both published by you. It appears that results, using Dr. Calhoun's equation, would be about 20 times as great as those from the Jones equation.

J. C. Reid,
Vice President,
Southern Union Gas Co.,
Dallas, Tex.

Answer—

Volume 1 of Jones' **Petroleum Production,** page 44, does not list an Equation 4, and we presume that some other reference is being quoted. We do find, however, an equation in Volume 1, Jones' **Production Engineering,** page 28, Equation 11, for permeability calculated from gas flow data. The equation for gas flow, radial system, which is item No. 8 under Engineering Fundamentals No. 316 is somewhat in error. The first equation under this designation, that for Q_m, is correct. The equation for Q_s should have an extra 14.7 in the denominator. The equation for Q_s should read:

$$Q_s = \frac{700}{ZT_f} \frac{Kh\,(P_e^2 - P_w^2)}{\mu \ln R_e/R_w}$$

where the nomenclature is the same as that given in Engineering Fundamentals No. 316.

A comparison of this equation as corrected with that given by Jones, cited above, will show the two equations to be identical. Jones has a constant of 305, but he expresses his logarithm as being to the base 10. Inasmuch as Calhoun's logarithm is expressed as being to the base 2, the ratio of 700 to 305 should be 2.3, which is found to be the case.

—*Editor.*

Particularly Intriguing

"From an engineering standpoint, our problems here in the South are particularly intriguing. The use of drilling barges in bayous, canals, and shallow bays; the construction of pipe lines across marshes and under rivers; heaving shales, which opened up a new field in mud engineering; the

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VAPOR-TIGHT, too!

Inspect this **NEW**

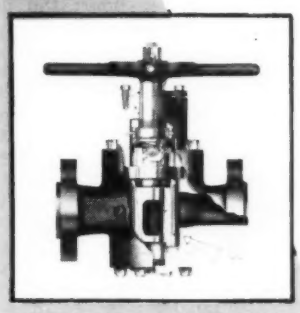
KEROTEST

General Twin Seal

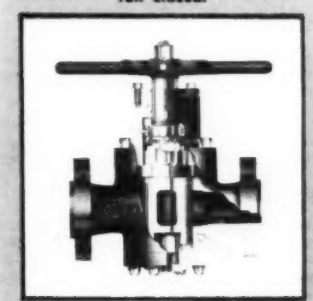
Non-Lubricated

VALVE!

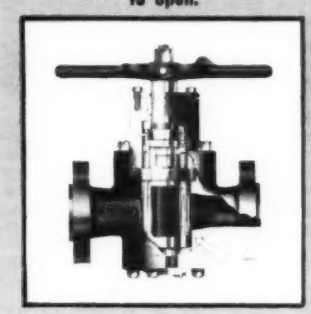
- NO STICKING
- NO GALLING
- NO SCORING
- NO TWIST-OFFS
- NO DAILY MAINTENANCE



Plug down . . . seats expanded against body ports . . . valve full closed.



Plug raised . . . seats retracted clear of body wall . . . free rotation . . . no scoring. Ready to open.



Plug rotated 90° . . . valve full open.

Investigate this new non-lubricated plug valve—the Kerotest General Twin Seal Valve—that assures vapor-tight seating and complete elimination of scoring, galling and sticking. There's almost no wear—1¼ turns operates—and renewable seats can be quickly replaced through the bottom plate. The Kerotest General Twin Seal Valve is recommended for gas and volatile liquid service and is furnished in body and trim materials suited to your specific requirements.

Write for the new Kerotest General Twin Seal Valve bulletin which gives complete specifications and engineering data.

KEROTEST MANUFACTURING COMPANY

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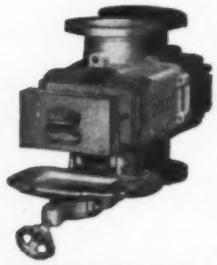
Specify

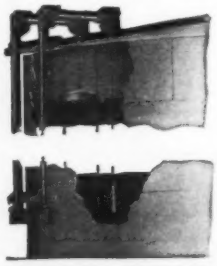
OCECO FITTINGS

YOUR TANKS DESERVE THE *Best*

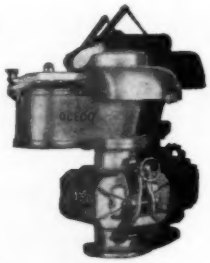
● Oceco Tank Fittings have been demonstrating their outstanding advantages—in all parts of the world—and under all kinds of conditions. Let the Oceco engineers — help you equip your tanks too, for utmost safety and economy. Send for the Oceco data sheets. They give complete information on sizes, weights, prices, etc. *Write today.*



TYPE "E" FLAME ARRESTORS can withstand long exposure to fire. The "banks" have vertical straight through passages — minimizing entrainment and pressure drop, and are "extensible" for easy cleaning. 2" to 10" sizes.



LIQUID LEVEL INDICATORS AND GAUGES — wide variety of types for roof or on the ground readings of cone, umbrella, floating, or expansion roof and spheroid tanks. Pressures ranging from 0 to 125 lbs. per sq. in.



TYPE "BE" VENT UNITS consist of a V-113 Vent Valve with snuffer, mounted on a Type "E" "Extensible" Bank Flame Arrestor. 2" to 10" sizes. Unsurpassed for efficiency and reliability.

GUAGE HATCHES provide a gas tight closure for gauging, sampling and taking temperature readings. Pedal type hatch opens with a natural straight downward foot movement. Flanged or screw mounting. Also clamping cover type for pressures from 2 oz. to 15 lbs.

V-100 EMERGENCY PRESSURE RELIEF VENTS provide instant relief for excessive internal pressures, resulting from exposure fires, etc. Furnished in 6", 8", 10", 15¼" and 20½" sizes.

WATER DRAW-OFF VALVES for drawing water from the bottom of storage tanks. Unique double valve construction permits the valve chamber to be drained to prevent freezing, and the working valve serviced without emptying tank. 2"x1½"; 3" x 2" and 4" x 3" sizes.

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erection of storage terminals in marsh areas where we have to make our own foundations before erecting tanks and pumps; the bringing in of oil wells where pressures, permeabilities, and porosities are among the highest in the world, all present new and novel problems. Many of these were unencountered and unsolved until engineers tackled them down in this country.

"Of special interest has been the construction of drilling platforms and the drilling of wells in the open Gulf of Mexico. From the time we began to explore the offshore area with seismograph and radar until submarine lines were laid from producing wells 5 miles out in the open gulf to shore terminals, the industry has called on engineers every step of the way. The construction of platforms in 65 ft. of water of sufficient strength to withstand hurricanes up to 125 miles per hour; the drilling of wells as deep as 13,000 ft.; communication between drilling platforms and shore; transportation of personnel and equipment; the movement of crude from wells to onshore terminals; and the laying of pipe lines along the floor of the ocean have called for the utmost in engineering skill and resourcefulness. Both the nation and the industry are deeply indebted to the engineering members of our petroleum fraternity, for without their aid and assistance we could not have solved these difficult problems."

Harold C. Teasdel, president, The California Co., New Orleans.

CALENDAR

November

American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York City, November 26-December 1.

Rocky Mountain Oil and Gas Association annual meeting, Denver, November 30-December 1.

Southwestern Geophysical and Geological Conference, Hotel Texas, Fort Worth, November 30-December 2.

December

American Institute of Mining and Metallurgical Engineers, annual joint meeting Texas sections, Texas Technological College Lubbock, Tex., December 1-2.

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio. December 3-5.

New York Oil Heating Association, Hotel Statler, New York City, December 4.

Oil Industry TBA Group, 1950 meeting Edgewater Beach Hotel, Chicago, December 4-5.

New Mexico Oil and Gas Association, annual meeting, La Fonda Hotel, Santa Fe. December 6.

Natural Gasoline Association of America. Herring Hotel, Amarillo, December 8.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston. December 11-13.

1951

January

American Gas Association, home-service workshop, Hotel Statler, Washington, D. C., January 3-5.

Kansas Oil Men's Association, annual convention, Lassen Hotel, Wichita, January 8-9.

Society of Automotive Engineers, annual meeting and engineering display, Hotel Book-Cadillac, Detroit, January 8-12.

American Institute of Electrical Engineers, Tulsa Section, meeting on explosion-proof motors, Michaelis Cafeteria, January 11.

Southwestern Legal Foundation, second annual institute on oil and gas law and taxation, Southwestern Legal Center, Dallas, January 18-20.

Compressed Gas Association, annual meeting, Waldorf-Astoria Hotel, New York City, January 22-23.

Northwest Petroleum Association, annual convention, Nicollet Hotel, Minneapolis, January 25-26.

Southern Gas Association, employe-relations section and accident-prevention round tables, Mobile, Ala., January 26.

Instrument Society of America, New York section, Hotel New Yorker, New York City, January 26-27.

February

American Institute of Electrical Engineers, Tulsa Section, meeting on explosion-proof electrical equipment, Michaelis Cafeteria, February 8.

American Institute of Mining and Metallurgical Engineers, annual meeting, Jefferson and Statler hotels, St. Louis, February 19-22.

Kentucky Petroleum Marketers Association, annual meeting and trade show, Brown Hotel, Louisville, February 20-21.

Iowa Independent Oil Jobbers' Association, Inc., annual convention, Hotel Fort Des Moines, Des Moines, February 21-22.

Wisconsin Petroleum Association, annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 27-28.

March

American Society for Testing Materials, spring meeting and committee week, Cincinnati, March 5-9.

American Petroleum Institute, division of production, southwestern district meeting, Hotel Beaumont, Beaumont, Tex., March 7-9.

Indiana Independent Petroleum Association, spring convention and refiners and suppliers exhibit, Hotel Severin, Indianapolis, March 8-9.

Mid-West Gas Association, Hotel Fontenelle, Omaha, March 12-14.

Illinois Petroleum Marketers Association, annual convention, Sherman Hotel, Chicago, March 13-15.

National Association of Corrosion Engineers, annual conference and exhibition, Statler Hotel, New York City, March 13-17.

Gas Appliance Manufacturers Association, annual meeting, The Homestead, Hot Springs, Va., March 19-21.

Ohio Petroleum Marketers Association, annual convention and marketing exposition, Deshler-Wallick Hotel, Columbus, Ohio, March 20-22.

American Petroleum Institute, division of production, Mid-Continent district spring meeting, Herring Hotel, Amarillo, March 21-23.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30.

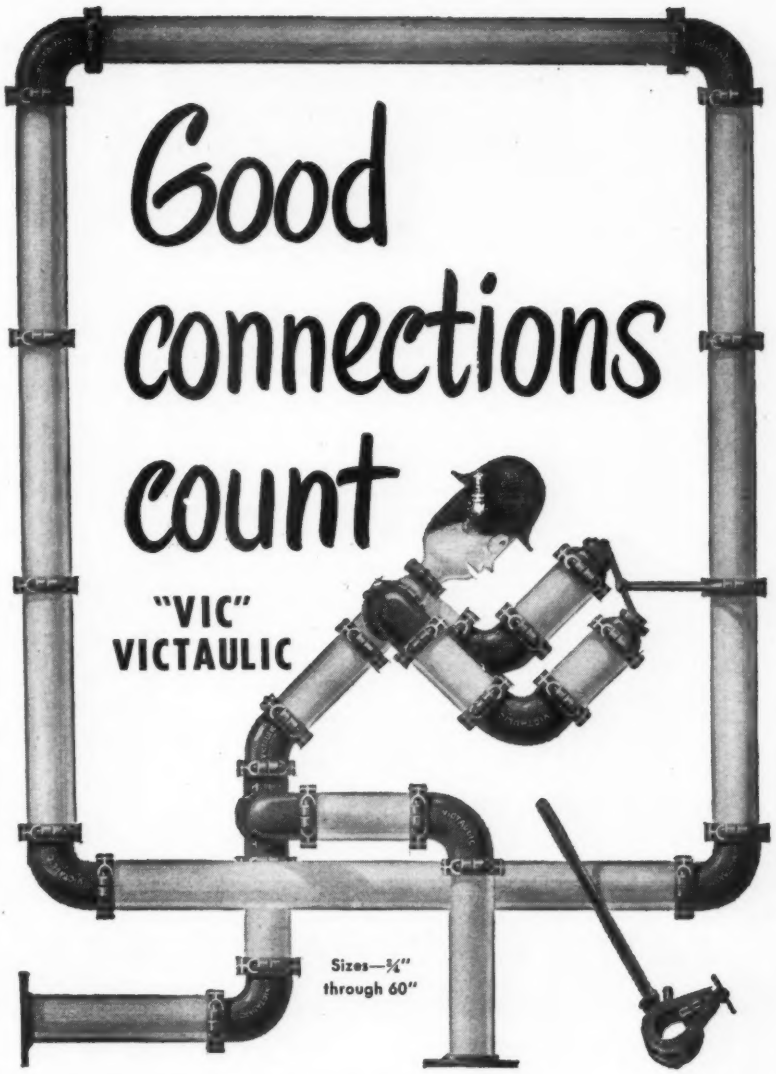
April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

American Society of Mechanical Engineers, spring meeting, Atlanta, April 2-5.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of



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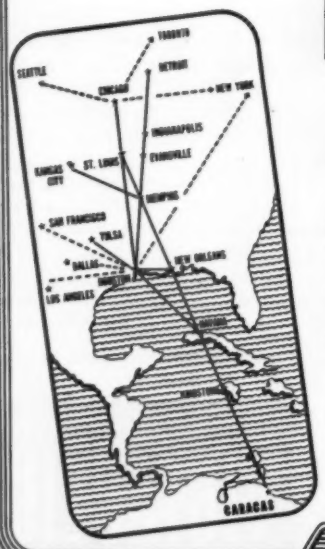

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production, Eastern district meeting, Desher-Wallick Hotel, Columbus, Ohio, April 3-5.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 10-12.

American Gas Association, distribution, motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

May

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 6-9.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

American Petroleum Institute, division of marketing, mid-year meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, division of production, mid-year meeting, Brown Palace Hotel, Denver, May 28-June 1.

June

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

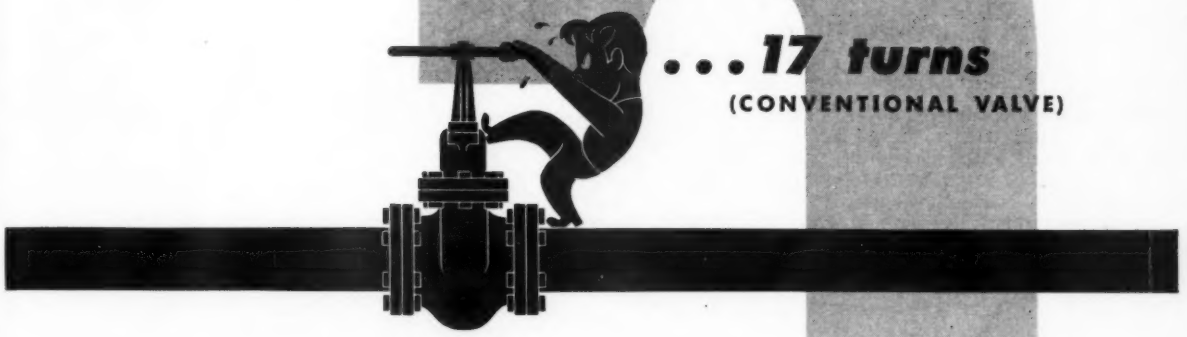
Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

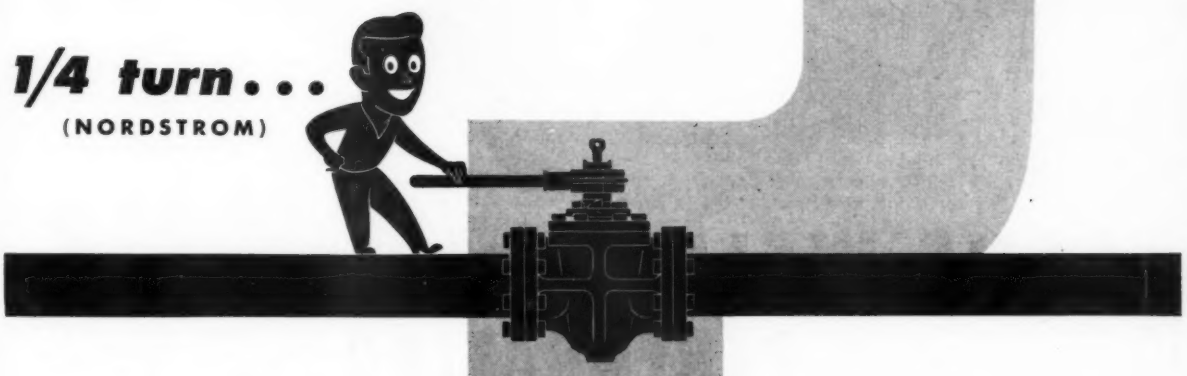
New York Nomads, annual Christmas dance, December 9, Hotel Pierre.

Why labor to close a valve?



. . . 17 turns
(CONVENTIONAL VALVE)

1/4 turn . . .
(NORDSTROM)



NORDSTROM VALVES

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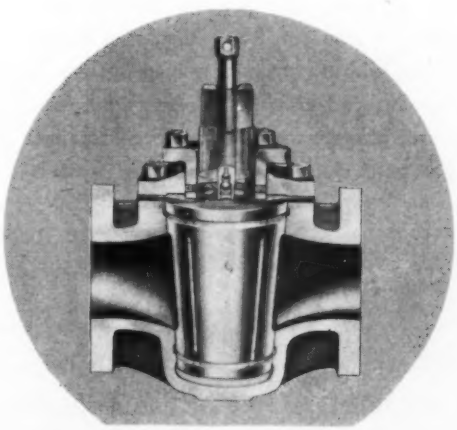

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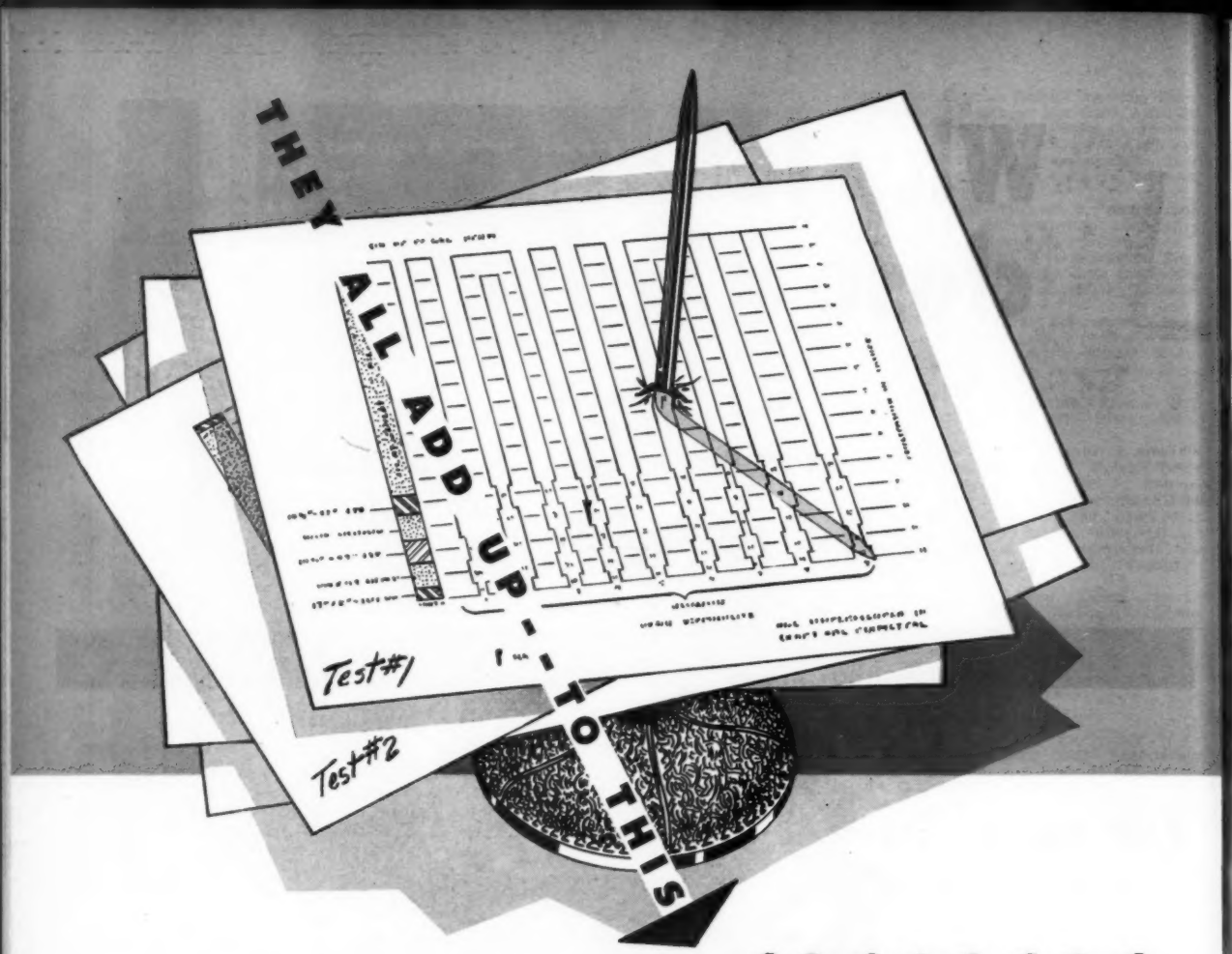

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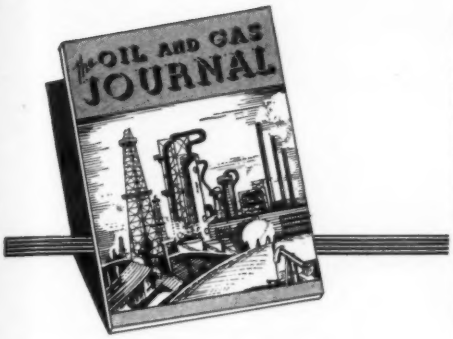

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JOURNALLY Speaking

Seen Benzene?

WITH much squirming and humiliation we are forced to admit that our favorite oil publication made a mistake in spelling—and right in our own field, too. It involves this benzol-benzine-benzene business that has been in the news lately.

It seems that various members of our staff were using the terms more or less indiscriminately and haphazardly. This lack of uniformity bothered our copy desk, so somebody dug out a book which said that benzol and benzene were coal-tar products and benzine was a petroleum product. This seemed like sufficient authority, so benzine it was.

Then the protests started coming in from readers better versed in modern chemical nomenclature. Didn't we know, was the gist of the letters, that we were years behind the times? that the book we relied on was obsolete? that the product is all the same chemically regardless of the source or method of manufacture? that the people who decide such things have settled on benzene with an "e" and that the other two words are no longer used in polite chemical society?

It took one of our men 3 days of research to make sure that our readers were right and our writers were wrong, but now we are ready to confess our error and bow to the march of progress in chemistry and orthography. Benzene it is henceforth.

Kelly or Kelley

SPEAKING of the "e" in benzene and of spelling problems in general, we had much trouble a while back with an extra "e" in Kelly as the name for an oil field in Scurry County. Our favorite oil publication and everyone else who wrote about it seemed to use both Kelly and Kelley with complete abandon and impartiality. We wrote to various people who should have known, but got no authoritative answer. Somebody told us the discovery well was the Magnolia 1 Kelly. Somebody else said the field was named for a Magnolia geologist named Kelley. Just in time to save our copy desk from suffering a nervous breakdown the field suddenly became known as Kelly-Snyder. There has never been any explanation of what happened to that elusive "e."

Basin Trouble

PHIL INGALLS, who writes the page on hot plays and cold geology which leads off our field reports every week, is singing the Basin Street Blues these days.

His basin difficulty stems from the area in the northeast corner of Colorado and the notch of Nebraska which fits around that corner. In that area there is a lot of drilling and leasing activity and underneath it is a deep geological basin. That much he knows for sure, but every time he calls the basin by a name he makes somebody mad.

Up in Wyoming they told him to call it the Julesburg basin, because the little town of Julesburg, right on the state line, is pretty much the center of activity. But when his friends in Denver heard about it they protested that it is properly known as the Denver basin. In hopes of effecting an agreeable compromise, peace-loving Phil suggested calling it the Denver-Julesburg basin, but then both sides got mad.

So Phil laid his troubles before the august United States Geological Survey, which ought to be the last word on such subject. He got back a two-page, single-spaced letter citing reference to early uses of both terms with true governmental impartiality. On this record it looked as though Julesburg had the edge until the last paragraph, in which the author said that he, personally, never used Julesburg. This threw Phil for a loss until he discovered that the man who wrote the letter was a resident of Denver.

Then he began to smell a rat. His conclusion is that the whole thing is a feud between Denver and Julesburg.

Personally, we don't know anything about basins except the kind you wash your hands in, but we are for the little fellow every time. We will vote for letting Julesburg have the honor. Besides, Denver already has a sandwich named after it.

—Henry D. Ralph

how do you buy a good oil field service

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The OIL AND GAS JOURNAL

VOL. 49, NO. 30

November 30, 1950

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Flexibility Test

It now appears that refiners will have the opportunity this winter for a real test of plant flexibility that has been added by wartime and postwar expansion and modernization programs.

One of the objectives of these programs has been a wider range in yields so that a refiner can meet abnormal seasonal demands for a particular product without overproduction of other products. This improved flexibility up to now has not had a severe tryout.

The petroleum industry has not had a truly weak gasoline market in the past 8 years. Even in 1949 it was the continuing high demand for gasoline that made it possible for some refiners to operate.

The critical date for gasoline is the end of March, for it is then that gasoline stocks reach a peak before leveling off under the influence of increased consumption. Gasoline prices were reduced slightly near the end of the heating season in 1949 and 1950, but the pressure from gasoline stocks was not sufficient to cause a break in the market.

Extreme pressure on gasoline prices next spring may result from the unusual increase in distillate demand indicated for the 1950-51 season.

The statistical picture at the present time shows a good balance between supply and demand with a reasonable backlog of stocks.

However, demands for distillate fuels during the coming winter months can move up by as much as 20 or 25 per cent over last winter. Primary distillate stocks are slightly less than they were a year ago, and total distillate stocks, including material in consumer and reseller storage, are estimated at about last year's level. This means in effect that increased supply of distillates must come from refinery production.

Gasoline demands will be greater than last winter, but the probable increase is well below the estimated 20 per cent set for distillate fuels. If runs are increased to meet the distillate demand without a decided shift in yields from gasoline to distillate, gasoline stocks will build up enough to depress 1951 gasoline prices.

Refiners may be reluctant to shift yields from gasoline to distillate at the present differential in prices. But immediate profit should not be the test applied.

To wait until price changes force yield changes may be too late. Management must weigh lower temporary realization resulting from the production of 2 gallons or more of lower-priced distillate and 2 less of higher-priced gasoline from a barrel of crude against the possible loss from selling total gasoline output for several months next year at prices depressed by excessive gasoline inventories.

Now is the time to apply refinery flexibility and put it to a trial on a 1951 profit-and-loss sheet.

THIS WEEK

STEEL—Delays in getting formal allocation of steel from NPA for oil industry creating great difficulties for oil producers. . . . Supply conditions are worse than they were in 1948, with operators finding it difficult to finish various projects. . . . Some foreign steel pipe is available, but at prices prohibitive for smaller operators, who say that unless supplies of domestic pipe become easier, they will have to curtail drilling operations. . . . ¶Russell Brown of I.P.A.A. says he is hopeful that new order authorizing more manpower for PAD may hasten recommendations by that agency to correct serious pipe shortage. . . .

WASHINGTON—Bruce K. Brown of Pan-Am Southern Corp. named deputy petroleum administrator to head PAD. . . . Materials problem is agency's most pressing task, he declares in taking over duties. . . . ¶Senate committee says "siesta psychology" surrounding rubber, surplus-property-disposal programs, has given way to feverish paper work which is only a flimsy protection against threat we face. . . . Blunders in synthetic-rubber program cited. . . .

AVGAS—Aviation-gasoline problem, so acute a few weeks ago, being dealt with satisfactorily, PAD head says. . . . ¶What one refinery had to do to fill relatively small military contract shows why production of avgas can't jump quickly. . . .

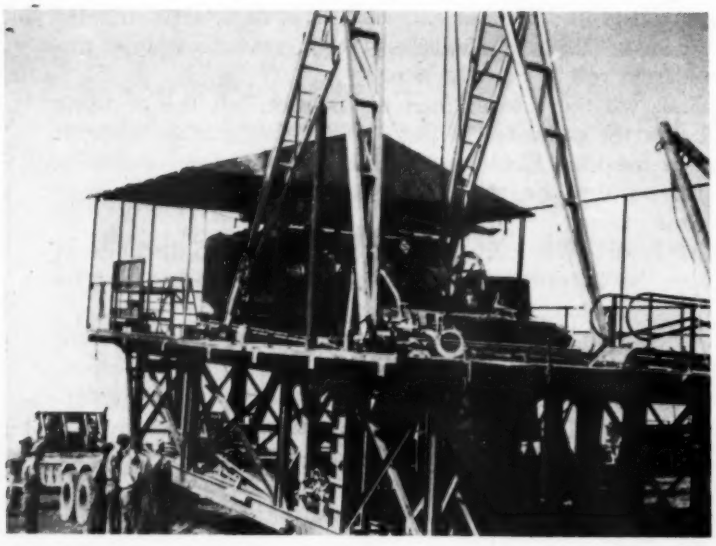
TRENDS—Refinery demand for major products in 4-week period ended November 18 was 8.3 per cent greater than in same weeks last year. . . . Demand for refinery gasoline was up 8.5 per cent. . . . ¶Distillate demand, averaging 1,063,000 bbl. daily, was up 21.2 per cent. . . . ¶Demand for refinery residual increased very little, but higher residual imports boosted total heavy-fuel demand.

ACTIVITY—Crude production for week ended November 25 averaged 5,824,075 bbl. daily, up 7,025 bbl. daily from previous week. . . . ¶Total completions decreased to 809 wells for the week compared with 885 for previous week and 776 in same week last year. . . . Wildcat completions dropped 15 wells to 169. . . . ¶Rotary rigs operating in United States on November 20 set another all-time record at 2,393 rigs. . . .

INDUSTRY—California Standard successfully carves a place for itself in highly competitive East Coast products market. . . . ¶Shell Oil Co. announces 800-well drilling program in California to reexplore old producing areas. . . . ¶Shell Development Co. officially opens expanded facilities at Emeryville, Calif., research laboratories. . . . ¶United Gas Co. signs contract to purchase gas from Pure's offshore wells. . . . ¶Vanadium in residual fuel oil contributes to furnace, boiler corrosion, A.S.M.E. told. . . . ¶Co-Ops getting back on their feet after successfully weathering toughest competitive battle in years. . . .

PRODUCTION—Louisiana sets December allowable at 621,710 bbl. daily. . . . ¶Old Moss Bluff dome area in Texas being revived after lapse of 17 years. . . . ¶New oil discovery made in Barons area of southwestern Alberta. . . .

INTERNATIONAL—Colombia announces sweeping decree law which meets virtually all objections which have barred oil exploration. . . . ¶Oil production found in Cerro Sombrero region of Chile. . . . ¶Venezuela sets new crude-oil production records on both weekly and monthly basis, producing average of 1,619,980 bbl. daily in October. . . . ¶Capacity of Cartagena refinery on Spanish mainland may be stepped up to 30,000 bbl. daily with new installations. . . .



ROMAN RIDER.—The horse-mounted types can be seen at most all circuses, but E. A. (Ed) Smith, president of Service Drilling Co., Tulsa, has developed a truck-assisted style by which he is moving his rigs. Many ¼ to 1½-mile "rides" have been made between drilling jobs, both in the Carver area, Hutchinson County, Texas Panhandle, and in western Kansas. Shown on a typical off-highway move is his No. 3 rig (a Unit U-15 which, with three engines, 23-in. rotary table, substructure, and mast legs, weighs 150,000 lb.). Left photo shows how the complete rig assembly is winched onto the two big tandem-type trucks. A single gin-pole-equipped truck follows in the rear; this one, on a move, "free wheels," out of gear. Turns and corners are easily negotiated when moving by one truck slowing, the other picking up.

Rubber's Troubles

Senate committee says 'paper-work preparedness' is not adequate; cites blunders in synthetic-rubber program

Bertram F. Linz

WASHINGTON.—The "siesta psychology" surrounding the rubber and surplus-disposal programs of the Government which it denounced last September has given way to feverish paper work—but "paper-work preparedness is only a flimsy protection against the threat we face," the Senate preparedness subcommittee reported last week.

The Munitions Board, General Services Administration, and Department of Commerce have made serious blunders and government officials have conducted public business "with less prudence than they would display in operating a charity bazaar," the subcommittee charged in a scolding report on the present rubber situation.

Especially singled out for criticism were the disposals of the Cotton Valley aviation-gasoline plant and the government-owned alcohol plants at Kansas City and Omaha.

"One of the most critical problems harassing our preparedness effort at the time is the shortage of high-octane aviation gasoline," the report declared. "This problem would be less acute if the 100-octane aviation-gasoline plant at Cotton Valley, La., had not been sold and, in part, scrapped."

Cost $6,600,000.—The Cotton Valley plant cost approximately $6,600,000 and produced alkylate during the last war and was capable of producing finished aviation gasoline. In June 1946, it was converted to the production of butylene concentrates for use in production of synthetic rubber and 2 years later the Reconstruction Finance Corp. declared the plant surplus and turned it over for disposal to the War Assets Administration. After efforts to sell the plant for on-site operation, General Services Administration sold it in June 1949, for off-site liquidation. Valuing the property at $2,100,000, WAA had rejected a bid of $300,500, but so far sales from the plant have aggregated only $533,027.

The subcommittee found that the Munitions Board never subjected the plant to the national-security clause and that WAA failed to keep a written promise to the Army-Navy Petroleum Board that it would keep it advised of declarations and sales of oil-refining properties as surplus. This, the subcommittee charged, was an administrative mistake "which, in view of the present aviation-gasoline shortage assumes proportions of a major blunder."

Entirely apart from the specific promise to keep the Munitions Board informed," the report commented, "it would seem that ordinary prudence on GSA's part would have dictated that GSA keep in touch with the board on its disposal activities affecting a plant of such importance. This might, however, have been a case of the blind leading the blind, for the Munitions Board earlier had indicated its lack of vision by failing to impose a national-security clause on the plant.

Belated action.—"GSA has now, belatedly, dispatched an engineer to inspect the Cotton Valley premises to determine the degree of disposal.

"The subcommittee hopes that GSA and the Munitions Board are going to work together more closely in the future. Neither the President nor any congressional committee can be expected to baby-sit throughout the emergency. But while experience might be a good teacher, this instance of negligence, poor coordination, and poor judgment will be nevertheless costly to the American taxpayer."

The report also criticized the sale of the Kansas City alcohol plant, which cost $4,000,000, for $701,000 on the same day that GSA announced that all surplus disposals had been frozen, and the disposition of the $7,100,000 Omaha plant on lease with an option to the lessee to buy at $1,750,000.

Although the subcommittee unanimously commended President Truman for his all-out-synthetic-rubber program and gave qualified praise to Rubber Reserve officials who were alert in understanding the implication of changing events and effective in implementing new policies but at times unnecessarily hesitant in recommending new policies, it found the present rubber situation highly unsatisfactory, with industry supplies of rubber far less than those on hand at the time of Pearl Harbor. Aside from the reactivation of all idle rubber producing facilities, the steps that have been taken are confined to studies which, while in the right direction, will not alone solve the rubber problem.

Not purely domestic.—The rubber question, it was pointed out, is not purely domestic, the position of our allies being even more precarious than ours because no other nation except Canada has synthetic facilities. This situation must be considered in our planning, the report declared, since our allies are no more capable of sustaining a military operation without rubber than are we, but investigation shows little evidence that our present rubber planning takes these factors adequately into account.

On the other hand, the subcommittee asserted, the nationals of friendly nations made more secure by our mobilization program "are obviously taking advantage of the tight situation created by our and their national emergencies to sabotage the preparedness effort by gouging unmercifully on their sales of rubber.

The Commerce Department came in for caustic criticism over the method followed in regulating the nonmilitary consumption of rubber by failing to follow up its "impressive paper work" aimed at reducing consumption by concrete steps to keep it within the limitation set.

Benzene.—The subcommittee also went into the benzene question, citing Commerce Department reports that domestic production will be some 30,000,000 gal. short of requirements, 20,000,000 gal. of it for the expanded synthetic-rubber program. This situation is now under study and, since production from byproduct coke plants cannot be materially increased and production from coal could not be attained for at least 30 months, it is indicated that production from petroleum, which can be developed in less than a year by any one or combination of several processes, offers the best opportunity for new supplies in a comparatively short period.

Alcohol.—The investigation also went into the alcohol situation, currently being met by arrangements for the importation of alcohol from France, and the subcommittee expressed the belief we should not have to depend on foreign sources for this vital product but develop additional facilities in this country.

"Rubber is in short supply," the subcommittee said in summing up its findings. "Adequate relief is not yet in sight. But present hardships may well be luxuries compared with hardships that will develop if our rubber limitation and allocation measures are not strengthened immediately.

"Our present extreme shortage of feedstocks for the synthetic-rubber program is a direct challenge to private industry. We hope additional feedstock facilities, particularly benzol facilities, will be built by private industry. Failure of industry to construct these facilities will leave no choice but government construction."

Recommendations.—The report car-

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ried a number of recommendations, including vigorous research by industry and Government to develop synthetics capable of substituting fully for natural rubber, development of natural-rubber production in this country and in the Western Hemisphere and establishment of an adequate reserve stock of guayule seed and planting of guayule nurseries to insure rapid expansion of guayule-rubber production "if and when it becomes apparent that our rubber supply line from southeast Asia is or will be cut."

PAD Appointment

Bruce Brown named deputy petroleum administrator

WASHINGTON.—President Truman paved the way last week for appointment of Bruce K. Brown, president of Pan-Am Southern Corp., as deputy administrator to head the Petroleum Administration for Defense through an executive order waiving present statutory prohibitions upon the receipt of outside compensation by government employes.

Under the order, persons "of outstanding experience and ability" may be employed without compensation by PAD and other defense agencies, but only when the requirements of the position "are such that the incumbent must personally possess outstanding experience and ability not obtainable on a full-time salaried basis."

The prohibition upon the receipt of salaries from their companies by officials coming in to the defense agencies has made it difficult to fill many important posts because men selected have felt it was undesirable to entirely sever their company connections, for pension and other reasons, and impossible to serve at the relatively low government salaries. In the case of PAD, these considerations have delayed the appointment of Brown for many weeks.

Truman opposed.—The waiving of the prohibition was opposed by the President but was nevertheless written into the law by Congress, and it was only after he was firmly convinced that the defense agencies could not otherwise secure the men needed to head up their programs that he issued the order.

The President stipulated that in appointing men who will serve without compensation, "the head of the department or agency involved shall take steps to avoid, to as great an extent as possible, any conflict between the governmental duties and the private interests of such personnel."

Complete statements of such appointments are to be filed by the defense agencies with the Federal Register, for public inspection but not for publication, showing the name of the appointee, the specific authority under which he was appointted, the employing department or agency, the title of his position, and the name of his private employer.

The chairman of the Civil Service Commission is to make quarterly or more frequent surveys of appointments made under the order, reporting his findings to the President and making such recommendations as he may deem proper.

BRUCE K. BROWN

Brown, who served as a second lieutenant of infantry during World War I, graduated from the University of Illinois in 1918 with a degree in chemical engineering which he supplemented in 1920 with an M.S. degree in chemistry. From 1920 to 1923 he was employed by Burgess Laboratories, Madison, Wis., and for the next 4 years was with the Commercial Solvents Corp., Terre Haute, Ind. He practiced chemical patent law in 1927, and in 1929 he joined Standard Oil Co. (Ind.), becoming general manager of the research and development department in 1938.

Leaving the company in November 1941, Brown became a special consultant on aviation gasoline in PAW. In July 1942, he was named assistant deputy petroleum administrator and served in that capacity until December 1944, when he went back to Standard as vice president and director. In 1949 he became president of Pan-Am Southern Corp. He also served as chairman of the military petroleum-advisory board from July 1947 until his appointment in PAD

Materials Problem

It is the most pressing task facing PAD, new deputy petroleum administrator declares in taking over duties

WASHINGTON.—Dealing with the problem of materials is the most pressing task immediately facing the Petroleum Administration for Defense, it was declared last week by Bruce K. Brown as he was sworn in as deputy petroleum administrator.

Brown, who resigned as president and director of Pan-Am Southern Corp. and went on indefinite leave with pay from the company to serve the Government without compensation, took over his new post a bare 24 hours after President Truman signed an order waiving the prohibition against the receipt of outside compensation by government officials.

With his appointment and authority to employ badly needed men without compensation, PAD is expected in the next few weeks to develop the organization of a staff headed by experienced industry men, but Brown said the force will be kept to the minimum required to do the job and possibly as few as 40 industry men will be required to head up its programs.

Brown's installation as operating head of the oil agency was made a matter of some ceremony by Interior Secretary Oscar L. Chapman, who wound up an important meeting to be present.

Contributions outstanding.—"Mr. Brown's contribution to the overwhelmingly successful record of oil in World War II is, in my judgment, outstanding among the splendid accomplishments of those who contributed to the wartime petroleum program," Chapman said. "As assistant deputy administrator of the Petroleum Administration for War, he gained experience and performed tasks which, when added to his acknowledged technical and expert competence, makes him uniquely qualified for the job to which I have now appointed him. More recently, as chairman of the Military Petroleum Advisory Board, Mr. Brown has obtained at first hand a knowledge of military requirements and the steps that must be taken to satisfy those requirements which will be indispensable in enabling the petroleum administration to discharge its responsibilities effectively."

Avgas problem.—Discussing the situation he found as he went into office, Brown said the aviation-gasoline problem which was so acute a few weeks ago has been dealt with so satisfactorily as to prompt Defense Secretary George Marshall to write a letter of appreciation.

WATCHING WASHINGTON

Bertram F. Linz

Tight Pipe

Delays in getting a formal allocation of steel for the oil industry from the National Production Authority—inevitable but unhappy—is creating great difficulties for oil producers, particularly the smaller operators, it is disclosed by reports reaching Washington.

Already, it is asserted, supply conditions are worse even than they were in early 1948 and conversion arrangements, gray-market activities and use of second-hand pipe are spreading rapidly.

Many operators, armed with cash to lay on the line, are finding it difficult to get pipe to finish out their strings, and others have complained they have been forced to pay twice the market for steel required to enable them to carry out their commitments.

Some pipe is being imported from Europe, but at a higher price than domestic pipe, and "borrowing" from more fortunate operators is being pushed to the limit, it is reported.

Many of those complaining about the situation warn that unless supplies become easier they will have to curtail their drilling operations.

A report outlining the needs of the producing industry was submitted to NPA last month by PAD, but since it was of an informal nature NPA will not use it alone as the basis for any action. That report set the steel requirements of domestic producers at 1,785,000 tons during the coming year to support the drilling of more than 42,000 wells estimated to be required to meet an anticipated domestic and export demand of 7,000,000 bbl. or more daily.

PAD is pushing its materials study, based on the National Petroleum Council report submitted last September, and will submit a formal claim to NPA in a matter of days, but it is unlikely that the allocating agency will be able to pass finally on the program before the turn of the year.

'Tax Rationing'

"Tax rationing" of natural gas and higher rates to consumers may be the end results of imposition of an excess-profits tax without provisions for the relief of public utilities.

Those conditions would be inevitable if proposed taxes make it impossible for natural-gas companies to finance the completion of present expansion programs, according to testimony before the House ways and means committee.

Representatives of the industry flatly warned the committee that unless the legislation is carefully framed their earnings will be so reduced that it will be practically impossible to raise new money. In that event the companies would halt construction of additional facilities, which would necessitate the rationing of natural gas. And in addition, it will be necessary to apply for increases of anywhere up to 20 per cent in rates to bring earnings up to a normal return.

The situation would be most severe in those areas which now are just beginning to substitute natural gas for the manufactured product.

No New Canols

The Senate preparedness investigating subcommittee's critical report of the disposition of Government rubber-producing facilities is just one instalment from a continuous investigation which is going deeply into what the Government and industry have done to meet the problem of supplies of vital materials.

There will be more reports—on rubber, possibly going into the question of chemical feedstocks for the synthetic plants, the gray market in oil-country tubular goods, and many other phases of the preparedness program.

A similar investigating committee operating during the last war turned up a number of mistakes on the part of government agencies, among them the still-remembered Canol project which about now might be providing oil for our troops in Alaska if we had any there and they were still fighting the Japanese, and some less savory episodes connected with the building of ships and other war facilities. That committee, incidentally, proved the springboard from which its chairman, Sen. Harry S. Truman of Missouri, achieved the vice presidency.

Like its predecessor, the preparedness investigating committee, headed by Sen. Lyndon B. Johnson of Texas, plans to keep breathing down the necks of government officials, exposing promptly any mistakes they may make and demanding quick response to changes in the international situation. Johnson, for one, is determined that there shall be no new Canols.

The benzene problem is in the hands of PAD only for study, he said, and the tetraethyl-lead production appears at the moment to be at least equal to demand. However, Brown added, the lead situation will be put under study to determine whether this satisfactory situation will continue over an extended period.

Discussing the materials requirements of the oil and gas industries, on which PAD is now preparing a report to justify the claim it will file with the National Production Authority, Brown emphasized that not only steel but copper, aluminum, and other metals which are being put under priorities control are essential to the continued development of new oil reserves and the production of refined products, and said that the degree to which operations of the industry will have to be restricted will depend almost entirely on the availability of materials.

To absorb committee.—Brown said the military-requirements committee which he formerly headed will be absorbed into the PAD structure and he plans to discharge its members with thanks but will request them to continue their work on an informal basis until they can be transferred to his agency in a new but similar committee.

As Brown took over as directing head of PAD, Hugh A. Stuart, director of the Oil and Gas Division and acting deputy administrator for the past 2 months, was named assistant deputy administrator.

Hopes for Steel Easement

WASHINGTON.—Russell B. Brown, general counsel for Independent Petroleum Association of America, said last week that a presidential order authorizing more manpower for the Petroleum Administration for Defense may hasten recommendations by that agency to correct the serious pipe shortage, and expressed hope for definite action in solving the growing shortage of all oil-country steel tubular goods.

"Time has been lost on the steel question because there seemed to be nobody to take formal action in talking to National Production Authority which has charge of allocations." Brown expressed hope that PAD would make early recommendations to the Commerce Department agency.

The Interior Department has been advised on oil-industry steel requirements, as well as means of correcting maldistribution of tubular goods, by both I.P.A.A. and the National Petroleum Council. I.P.A.A. also made recommendations to the Interior Department for alleviating gray-market selling of tubular goods by enforcement of an antistockpiling regulation in the Defense Production Act.

Why Avgas Is Tight

What one refinery had to do to fill a relatively small military contract shows why production can't jump fast

Henry D. Ralph

PONCA CITY, Okla.—What a refinery has to do to get ready to produce military-grade aviation gasoline is illustrated by the case of Continental Oil Co.

The time, money, and interruption to normal operations show why the Government has had difficulty getting large quantities of avgas quickly. The example also shows what the refining industry generally will face if the output of aviation gasoline must be expanded appreciably.

Continental has a contract to produce between 2,750 and 4,000 bbl. per day of 115-145 grade aviation gasoline, chiefly at its refinery at Ponca City, Okla. This would seem like a relatively small quantity in view of the fact that the Ponca City refinery normally produces between 22,000 and 30,000 bbl. of motor gasoline daily.

Rearrangement.—Moreover, the Ponca City plant is a complete, modern refinery, and during World War II it turned out around 6,000 bbl. per day of the kind of aviation gasoline used then—100-130 grade. All the equipment was still available, and it was a matter of reinstalling and changing pipe lines and tankage for avgas service.

Yet to get ready to fill its contract Continental had to spend $310,000 and hire 150 extra men in addition to the 1,250 regularly employed in the Ponca City plant. And it took 2½ months to get ready in spite of top-speed work and much overtime.

There were two reasons for this. First, the wartime facilities had been converted to other uses, as Continental had not been making any commercial-grade aviation gasoline. Second, the kind of aviation fuel the military now requires is far more difficult to make than the grade used during World War II.

To make its contract amount of the precious stuff, Continental had to revamp much of its Ponca City plant to obtain high-octane components without loss of quality in its motor gasoline. Even so the Ponca City plant is not able to do the entire job. Some material must be shipped in from the Conoco refinery at Wichita Falls, Tex., and about 1,500 bbl. per day of partially finished aviation gasoline goes to Continental's big refinery at Lake Charles, La., for final blending.

General view of the Ponca City refinery of Continental Oil Co.

Fast work. — Continental's contract called for starting deliveries on November 1. Work started at Ponca City on August 15 and continued at a feverish pace right up to the deadline.

The method of making military avgas differs among refineries, but Continental's process involves blending three or four principal components — alkylate, toluene, isopentane, and either selected straightrun gasoline or what at Ponca City is called a "posttoluene fraction."

To make these products the Ponca City refinery had to revamp the stabilization equipment on its crude-distillation unit, put the hydroformer back into operation after an idleness of 5 years, reconvert the toluene plant to its original purpose, install new facilities for blending the finished gasoline with tetraethyl lead, revise considerable tankage, and lay many new connecting pipe lines.

Equipment available.—No new major pieces of equipment were required, and all parts and supplies were in stock at the refinery or were readily available at supply houses. The bulk of the new material needed was small valves and instruments to replace those which were worn or had deteriorated from disuse. The project was all engineered by Continental's process and engineering divisions, and the work was done by the refinery mechanical organization.

The first step at Ponca City was to prepare selected charging stock for the hydroformer for the production of feed stock for the toluene plant.

To do this, one of the four-stabilizer towers of the crude-distillation unit was revamped by rearranging the piping and heat-exchanger equipment. This converted it from a debutanizer to a stripper to handle material with an end point of 250° F. taken off three other crude units. This stripping tower was set up to process the front end of straightrun gasoline to a feed stock with a boiling point of 150° to 250° F. About 3,500 bbl. per day of this feed stock is sent to the hydroformer.

Idle unit.—The hydroformer had been idle since August 1945. As this unit had not been used it was necessary to inspect it minutely, make many small repairs, and rehabilitate it to operating condition.

This unit processes a special cut of 150° F. initial boiling point, which is prepared in the crude-stabilization equipment mentioned earlier. In addition to producing feed stock for the toluene plant it produces a condensate which goes to the feed-preparation system of the catalytic cracker for recovery of fractions used in the preparation of aviation gasoline.

The cracking unit is of the Thermofor moving-bed type, purchased from the Government but used since

the war for the production of motor fuels. The cracker continues this primary function, and in addition it prepares a B-B charge for the alkylation unit, using catalytically cracked C_4 and C_5 cuts and thermally cracked and straightrun C_4 cuts. The alkylation unit uses the hydroflouric acid process and was already in operation, its alkylate going into motor gasoline.

Toluene plant.—The third major job was rehabiltation of the toluene plant. This plant was also purchased from the Government following the end of the war. During the war this unit had made both aviation-grade and nitration-grade toluene, using the Shell, or phenol-extraction, process. Since then it had been used intermittently, after some design changes, for running crude or rerunning special products. It cost $50,000 to inspect, repair, and restore this to its original function.

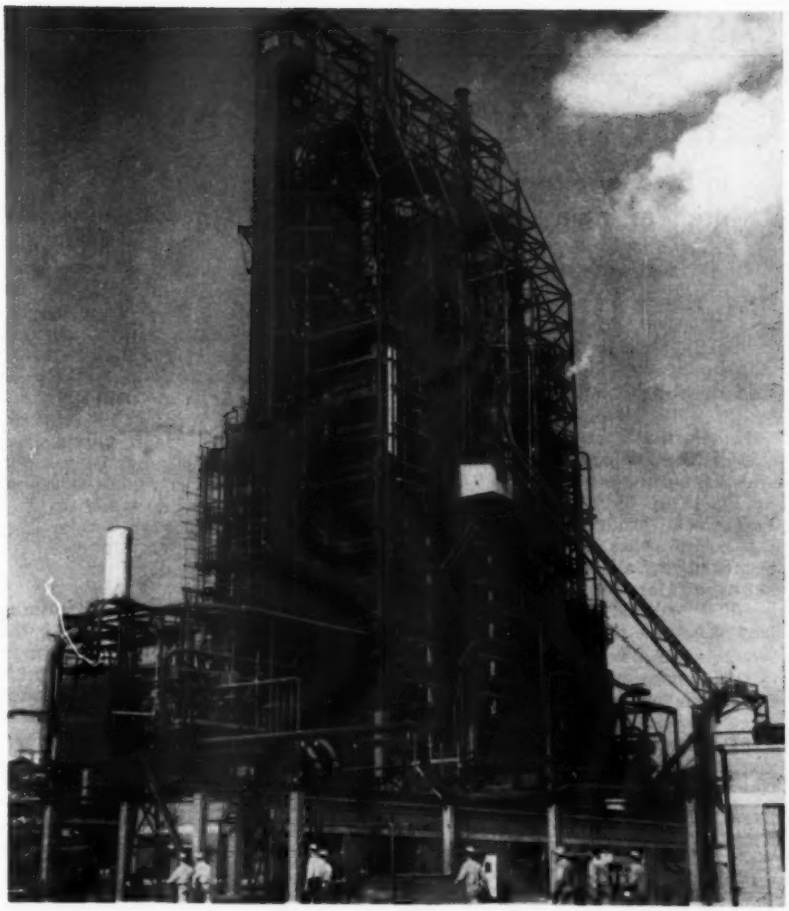
The present avgas contract requires the production of aviation-grade toluene only, but nitration grade could be made also if needed for the manufacture of military explosives by the installation of additional facilities which had previously been removed. This unit can produce more toluene than is needed for blending with aviation gasoline under the present contract, so it will also make some benzene which Continental will ship to its plant in Baltimore, Md., for the production of detergents.

The toluene plant will also make two additional products: A small amount of a raffinate fraction which will be blended into motor gasoline; and a posttoluene fraction which can be used as an alternative for straightrun gasoline in aviation gasoline.

Blending. — In addition to toluene, alkylate, selected straightrun gasoline, and posttoluene fraction, the 115-145 grade avaition gasoline requires the addition of small amounts of isopentane as a volatility agent. This will be provided from an outside source or shipped to Ponca City by tank car from Continental's refinery at Wichita Falls, Tex., at which point an adequate supply of this material is available with some equipment revisions there.

The final step at Ponca City is blending the various components in proper proportions and mixing in tetraethyl lead. This required the installation of blending equipment, much additional tankage, and extensive rearranging of piping. About 1,500 bbl. per day of the components will be shipped by tank car to Continental's refinery at Lake Charles, to be mixed with other components produced there and final blending with tetraethyl lead.

The biggest part of the entire conversion job was the rearranging of tankage and pipe lines for avgas service in the Ponca City plant. Some ingenious improvising was done in converting the stabilizing tower to run 150° F. initial-boiling-point material and a high degree of skill was involved in reconverting the toluene plant, but no particularly novel methods were required and in general the entire project was a more or less routine change in process design. Of the total expense, nearly half went for labor, the balance being for miscellaneous supplies and equipment, all of it standard and readily available.



The catalytic cracking unit, heart of the aviation-gasoline facilities at the Ponca City refinery of Continental Oil Co.

Motor gasoline.—Now that the preparations have been completed, operation under the military contract will interfere rather severely with the volume production of commercial motor gasoline at the Ponca City plant. The refinery has a rated capacity to handle 55,000 or 60,000 bbl. of crude daily, and in recent months it has been producing an average of about 22,000 bbl. of motor gasoline per day. Its output of motor gasoline will now be reduced by approximately 4,000 bbl. per day.

The quality of motor fuels will be maintained by the operation of additional equipment to offset the diversion of some of the high-octane components to aviation gasoline. The plant has been turning out premium gasoline with an octane rating of 88.5 by the research method and house-brand, or regular, grade of 82.5 octane. These octane ratings probably can be maintained by the use of other gasoline components made available from other operations.

This example of how a single refinery is affected by a contract for the production of a relatively small volume of aviation gasoline is typical of what many refineries have had to do in order to meet military requirements. A substantial increase in demand for aviation gasoline would require far more extensive revamping and construction work in many plants.

Tank cars.—Still another factor is the use of tank cars, and tank cars are already in short supply. To ship the components among the three Continental refineries involved and to deliver the finished aviation gasoline to the military will require the continuous use of close to 100 tank cars, although this may be reduced to the extent that deliveries are requested at flying fields close enough to Ponca City and Lake Charles to permit economical use of tank trucks.

XUM

California Comes East

In 5 years Standard of California has made a place for itself in highly competitive East Coast products market

Dahl M. Duff

THE official opening of a new $2,500,000 products terminal at Portland, Me., has marked another step in the consolidation of the new East Coast operations of Standard Oil Co. of California.

The Portland terminal is a part of the distributor organization through which the company has forced a place for itself in the highly competitive East Coast products market during the last 5 years. California Oil Co., Standard of California's eastern marketing affiliate, built the terminal as a 50-50 project with an established New England firm, Pocahontas Fuel Co.

The expansion of the Standard of California organization in the East since the end of the war has brought a new and highly aggressive company into the field in this part of the country. Further visible evidence of its activity is furnished at Perth Amboy, N. J., where another subsidiary, California Refining Co., will have a refinery with a capacity of 50,000-bbl. daily completed about next March.

In addition to the marketing and refining, another Standard of California subsidiary, The California Co., which carries on exploratory work and production in the South and Rocky Mountains, 1½ years ago began taking leases in wildcat territory of eastern Pennsylvania which had long been marked off as a likely oil prospect. Geologists, familiar with Standard of California's first-class exploratory record, began digging out old maps when this news leaked out. The program the company now has under way seems designed to test the area more thoroughly than ever before *(The Oil and Gas Journal, November 9, 1950, page 58)*.

Reasons given.—As far as refining and marketing are concerned, the reasons for Standard of California's eastern expansion are reflected in a one-paragraph statement contained in the company's recent third-quarter report. R. G. Follis, Standard of California board chairman, pointed out that for the first time crude production of subsidiaries in the Gulf Coast, Texas, and the Rocky Mountain states had exceeded the parent company's production in California.

The eastern organization which has been built up by the company meets the needs for an outlet for a substantial part of this production, which is of course too far removed from the company's West Coast domain. In having additional production to make possible the development of additional markets, Standard of California is somewhat unusual among the major integrated companies.

282,000 bbl. daily.—In his report, Follis added that total third-quarter domestic production was 282,000 bbl. daily, thus indicating an output in the Rockies and eastward of more than 141,000 bbl. daily. Officials of the company have indicated that the eastern outlets which have been developed in 12 states from Virginia north will be supplied out of the enlarged 50,000-bbl. daily Perth Amboy refinery, and that this is about as far as the marketing program will go. The main marketers in the East will still be companies like Esso, Gulf, and Socony-Vacuum, but Standard of California will have an operation in this section of the country to give what Follis in an earlier report called an "increased flexibility to the movement of crude oil and base stocks from our various sources."

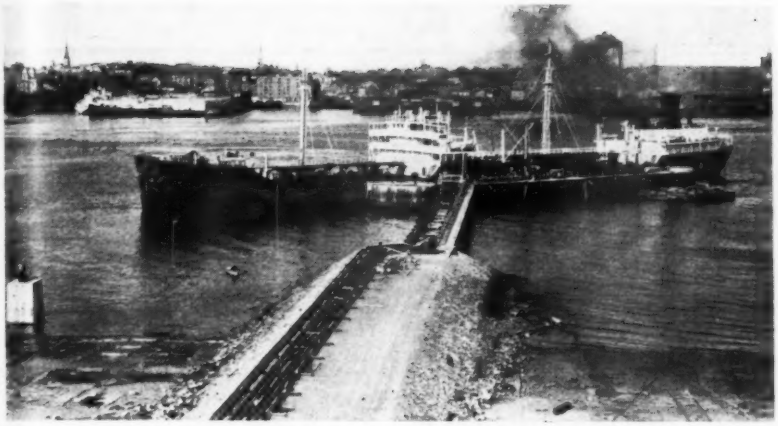
Foreign production.—Another advantage of an eastern refinery and markets to Standard of California lies in the company's major foreign production and reserves. It holds a 30 per cent share in the Saudi Arabian production now about to be delivered on the Eastern Mediterranean through the Trans-Arabian pipe line. In western Venezuela, it has extensive reserves of 10°-gravity asphaltic crude in Boscan field.

While the eastern operation primarily provides an outlet for production from the Southwest and the Gulf Coast, the crude requirements obviously can be met if necessary from foreign sources, including the Persian Gulf. American Bitumuls Co., another Standard of California subsidiary, now sells asphalt in the East out of three plants, East Providence, R. I.; Mobile, Ala.; and Baltimore, as well as from the asphalt facilities at Perth Amboy.

Standard of California is said to have more or less backed into the eastern market at the end of the war when a deal it had arranged with an East Coast company for the sale of gasoline from California fell through. Within the company, H. D. Collier, former chairman of the board of Standard of California, is credited with having initiated the East Coast program.

Organized in 1945.—Storage was first leased from Barber Asphalt Corp. at Perth Amboy, and California Oil Co. was organized December 14, 1945. The existing marketing organization for RPM lubricants in 31 states east of the Mississippi was taken over,

The enlarged Perth Amboy plant of California Refining Co. now nearing completion. Upper left is the new boiler plant and auxiliaries. To the right of the railroad tracks, beginning in the foreground, are: old tankage, catalytic cracking unit, crude units, and reformer. The alkylation plant is to the right of the catalytic cracking unit with the older part of the refinery beyond. In the upper right corner is nearby tankage of Shell Oil Co.



This photo shows the unloading of the first tanker November 1 at the Pocahontas Fuel Co.-California Oil terminal at Portland, Me. The new facilities can handle vessels up to the supertanker (28,000 dwt.) size.

and marketing of gasoline and heating oils, initially shipped from the West Coast, was commenced.

An interest was bought in the original 6,000-bbl. Barber Asphalt plant at Perth Amboy in early 1946, and this was subsequently increased to full ownership. California Refining was formed to operate the plant in July 1946. Capacity was raised to 25,000 bbl. daily, mainly by bottleneck removal and minor new equipment. The program now under way will double this.

The marketing operation of California Oil differs markedly from that carried out on the West Coast in that in the East it is done entirely through distributors with no company operation of bulk storage or retail outlets. The 18 distributors selling through 206 stations which California Oil had at the end of its first year have grown to the present 65 distributors serving more than 2,000 dealers.

Perth Amboy plant.—When finished early next spring, the new Perth Amboy refinery will be one of the most modern refineries on the East Coast. Construction was begun in the spring of 1949. Two identical 12,500-bbl. two-stage atmospheric and vacuum crude units are being built. The plant, which now has no catalytic cracking, will have two twin Houdriflow units each rated at 12,500 bbl. daily.

Another feature of the enlarged refinery will be a sulfuric-acid alkylation unit rated at a feed charge of about 5,000 bbl. daily. This is the first new alkylation facility to be built in the country since the end of the war. Its production will supplant high-octane blending components now being shipped in at Perth Amboy. Other facilities being added to the refinery include new lead sulfide treating and additional auxiliaries to serve the expanded plant.

The flexibility of the refinery and its possible use of Persian Gulf crude is pointed up by the fact that all new process units are designed to handle sour-crude stock. Under present plans, Gulf Coast and Venezuelan crudes will continue to be used. New asphalt-blending and shipping facilities were completed at Perth Amboy in April.

Expansion.—Expansion of the refinery and the marketing organization has proceeded concurrently. Earlier this year, California Oil bought the blending and compounding plant of New York Lubricating Oil Co. at Bayway, N. J., for the processing, finishing, and packaging of lubricating oils and greases. Barge gasoline terminal facilities were set up at Burlington, Vt., and Buffalo, N. Y., and a long-term throughput arrangement on gasoline and fuel oils was arranged at Boston. Coastal Petroleum Co.'s shutdown refinery and terminal facilities at Blakely Island, near Mobile, was acquired in January to provide American Bitumuls with additional distribution facilities in the southern market.

The new Portland terminal will handle the distribution of products through distributors in New Hampshire and Maine. California Oil, which operates three tankers and charters others, will ship products in from the Perth Amboy refinery. At present, the terminal storage facilities consist of six tanks which will be used as follows: two of 96,000 bbl. for Bunker C; one of 96,000 bbl. for kerosine; one of 96,000 bbl. for No. 2; one of 96,000 for regular gasoline; and one of 54,000 bbl. for premium gasoline.

Loading facilities.—The first tanker to discharge at the terminal contained 125,000 bbl. of kerosine and No. 2. Its discharging time was 15½ hours. Terminal-loading facilities include a truck rack for six tank trucks simultaneously; two tank-car tracks with a total 24-car capacity; and barge loading on the inshore side of the wharf. The plant also is designed to bunker tankers with No. 6.

Persons familiar with the East Coast market say that California Oil's expansion into this field has not been as easy as it might seem. An independent marketing official pointed out that what has been accomplished was done with the backing of the resources of one of the largest companies in the business.

Lower prices.—In some cases, the inducement of a lower price has been used, according to market sources. Some distributors who felt they were being neglected or treated unfairly by their existing suppliers, shifted over to the new company. Picking up these, one marketing official commented, mean' that the company was taking on a certain amount of "chaff" which will probably have to be separated out of the organization later.

All and all, however, it is felt that Standard of California took the least costly way of breaking into the eastern market. The other alternative would have been an extremely expensive program of construction of a network of stations, bulk plants, and terminals.

California Oil Co.'s promotion of its gasoline is illustrated in this view of a service station in the New York City area.

Shell Activities

800-well drilling program in California planned by Shell Oil Co.; Shell Development opens expanded laboratories

D. H. Stormont

SAN FRANCISCO. — Following a meeting held here last week, Shell Oil Co.'s board of directors announced the company shortly will begin a long-range, 800-well drilling program in California's older oil fields. The program, to be carried out over the next few years, will be designed to develop known deeper oil reservoirs and pools passed up in earlier developments. Some of the fields slated for new work have been producing for more than 50 years.

Prior to the meeting Shell's directors had spent several days inspecting its California properties, including Shell Development Co.'s new research laboratories at Emeryville, Calif. The tour, President H. S. M. Burns said, gave the directors firsthand knowledge to aid them in their consideration of plans for continued expansion of Shell's West Coast properties.

Using today's exploration and production techniques, largely unknown at the time many of the wells in these old fields were drilled, Shell believes will result in oil being obtained from horizons once bypassed or not yet drilled into. Two fields listed for such deeper or in-fill drilling were Ventura and Brea. The former was slated to receive some 200 new wells.

Operating 15 rigs.—Shell currently is operating 15 rigs in its California activities, of which 10 are in the Ventura Avenue field of Coastal district. In this outstanding old field, eight of the rigs on November 22 were reported to be drilling at depths below 11,000 ft. Shell's other two rigs in the field were drilling below 7,000 ft.

Describing the accelerated program, Burns stated that it is designed to meet the natural increase in consumer demand for petroleum products due to increased population in the West and as a defense measure. The strategic location of California's oil-producing areas in relation to the Far East with its present military significance, makes Shell's expanded program all the more important.

Laboratory unit opened.—Included on the directors' agenda was the official opening of additional facilities at Shell Development Co.'s Emeryville research laboratories, which include a new 4-story office and laboratory building.

Because of the expanded facilities Shell Development (the research affiliate of Shell Oil Co., Shell Chemical Co., and Shell Pipe Line Corp.), has been able to consolidate all its activities at the 7-acre laboratory site. More than 5,000 people visited the laboratories during the open-house.

The laboratory's three principal buildings, containing 127,000 sq. ft. of floor space, house most of the research laboratories, offices of the research and development divisions, and the administrative and general offices. The patent and engineering departments, formerly located in the Shell Building in San Francisco, now also are in these buildings. Numerous smaller buildings house other labs, pilot plants, shops, and service buildings.

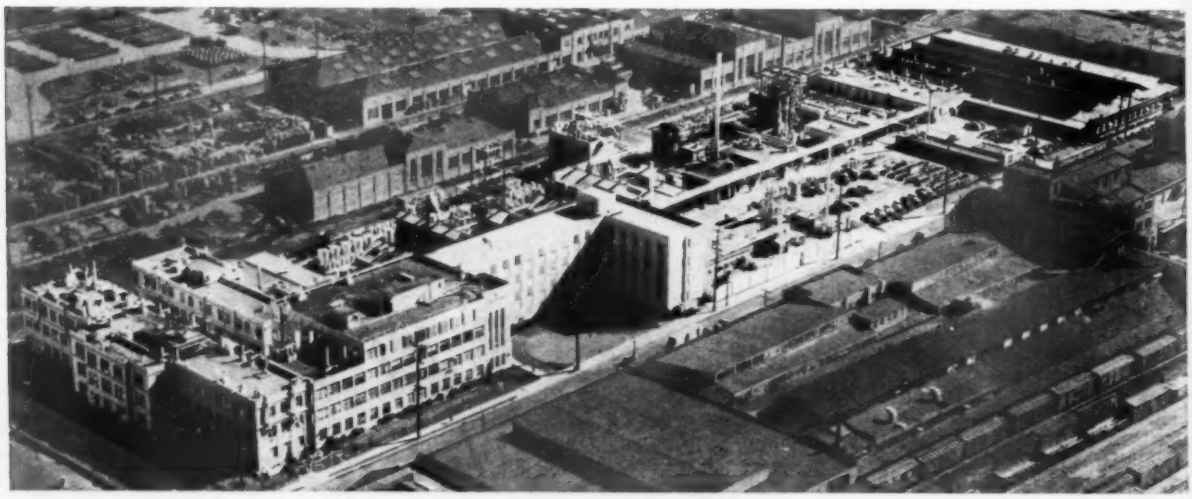
Shell Development's president, M. E. Spaght, in marking the occasion at a press interview, pointed out the growth of the petrochemical industry. Over one-half of today's synthetic organic chemicals are produced from petroleum, he said. Shell Development has been an outstanding pioneer in this work he added, mentioning the many processes and chemicals which have been developed at Emeryville.

Sale Reported Under Way

LOS ANGELES.—Negotiations for the purchase of North American Oil Consolidated Co. of San Francisco for over $22,000,000 are under way here. The deal was brought to light by the filing of an escrow in a local bank last week through which Tevis F. Morrow of Los Angeles is offering the company's stockholders $80 a share for the 271,659 outstanding shares of common stock.

Since some of the larger stockholders have indicated a willingness to sell, it is generally believed the deal will be consummated.

The escrow, which will close on December 12, calls for the deposit of at least 181,106 shares, or 66⅔ per cent of outstanding, $10 par common stock, although the purchaser reserves the right to buy any stock so deposited. Also contained is an agreement from Republic National Bank of Dallas, guaranteeing the $22,140,-



Aerial view of Shell Development Co.'s research laboratories at Emeryville, Calif., directly across the bay from San Francisco. Expanded facilities were officially opened last week.

209 required for the purchase of all outstanding shares, plus commissions and expenses of the transaction.

Largest stockholder in North American is Bankline Oil Co., which owns 27,200 shares or slightly more than 10 per cent. Irvine Estate Co., Los Angeles, holds about 17,700 shares. The remainder is divided among some 1,800 holders.

North American has production in Oklahoma, Texas, and Louisiana but the major portion of its oil holdings are in Buena Vista, Edison, and San Ardo fields of California. Its current crude production is in the vicinity of 5,500 bbl. daily. Thus the present offer is around $4,000 per barrel of daily production.

GULF COAST

Gas Contract Signed

United to buy from Pure wells off Gulf Coast

Leigh S. McCaslin, Jr.

HOUSTON. — A contract has been executed between United Gas Pipe Line Co. and Pure Oil Co. for the purchase by United of gas from Pure leases in Gulf of Mexico waters 15 miles offshore from the Louisiana coast.

This marks the second entrant in the campaign to market gas from the 18 gas or gas-condensate discoveries which have been made off the Texas and Louisiana coasts. Tennessee Gas Transmission Co. was the first pipeline concern to go after Gulf of Mexico gas. It will soon be picking up gas from another Pure field, Rollover field, located 9 miles off the coast of Vermilion Parish, Louisiana. The 8⅝-in. pipe line was installed and will be operated by Marine Gathering Co., Houston.

United Gas has signed to obtain gas from Pure's leases in Block 32 of the Eugene Island area of St. Marys Parish, Louisiana. The field is directly south of the village of Burns, La., and the maximum water depth in the area is about 11 ft. Pure presently has two oil wells producing in the field and one well drilling. The company has tentative plans to drill at least 16 wells to satisfy United's requirements. It is expected that each well will have a daily capacity of from 15 to 20 million cubic feet of gas, or a possible total of 320 million cubic feet per day. (As a basis of comparison, this is over 60 per cent of the maximum daily capacity of Transcontinental Gas Pipe Line Corp.'s Gulf Coast-to-New York City line).

Will recomplete well.—As an indication of the increasing value of natural gas, it is interesting to note that Pure plans to recomplete its two oil wells as gas producers. The two oilers are currently producing around 300 bbl. daily from sands at 8,500 and 9,600 ft. Gas sands in the area have been found between 10 and 12,000 ft.

Pure has one drilling platform in the Block 32 area at present from which it plans to drill a total of six wells. The platform is self-contained with all drilling equipment mounted on it as contrasted with the tender-platform method of drilling offshore wells.

The proposed facilities for delivering gas from Pure's wells will include approximately 15 miles of 20-in. pipe line. This will be constructed offshore by United to connect with its projected 24-in. line near Burns, La. Various engineering investigations and surveys are going forward preliminary to anticipated actual construction. Assuming approval by all necessary regulatory bodies, construction will start during the first part of 1951.

New supply. — The new gas supply which this development will provide constitutes a portion of the added reserves which will be made available to United through construction proposed in a pending application before the Federal Power Commission. The approval of this application will authorize United to add 1,130 miles of large-diameter lines to its present system in Texas, Louisiana, and Mississippi.

Cost of United's over-all extension program is estimated to be in excess of $111,000,000. Construction of the added facilities will provide an initial increase in the capacity of the company's pipe-line system of approximately 805 million cubic feet daily. This is an approximate increase of one-third over the system's peak-day delivery of almost 2½ billion cubic feet reached December 15, 1949.

Louisiana Sets Allowable

BATON ROUGE.—A December allowable for Louisiana fields of 621,710 bbl. daily was set last week by Conservation Commissioner S. L. Digby. This figure compares with 615,872 bbl. set for November. Most of the increase was accounted for by new production, Digby said.

Allowable breakdown by districts is: Houma, 114,915; Lafayette, 151,523; Lake Charles, 74,419; New Orleans, 159,563; Monroe, 71,166; and Shreveport 50,124.

Moss Bluff Revived

Salt dome area producing after lapse of 17 years

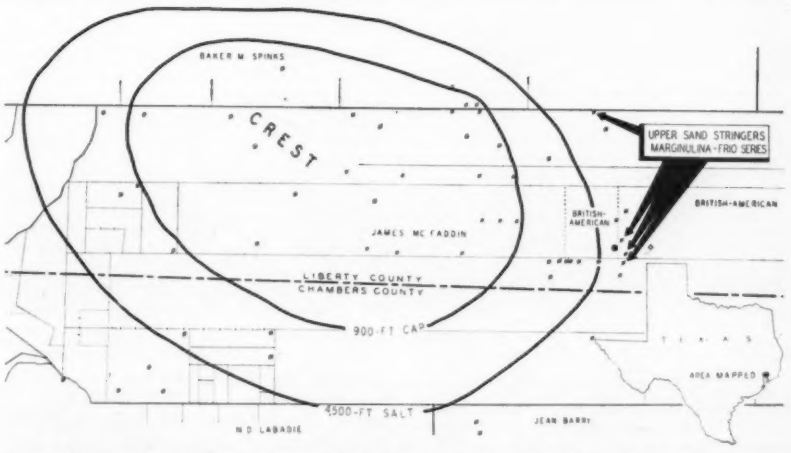
Joseph A. Kornfeld

HOUSTON.—After a lapse of 17 years, oil production has been revived on the east flank of the Moss Bluff salt dome located 10 miles southeast of Liberty in Liberty County, Texas.

One of the first piercement-type salt domes to be mapped by geophysics on the Gulf Coast, Moss Bluff was discovered during 1926 as the result of a refraction seismograph survey conducted by Gulf Production Co. (now Gulf Oil Corp.). Its discovery came about 2 years after the introduction of the seismograph in the coastal areas of Texas.

Drilling proved the existence of a salt dome of the piercement type, and disclosed its major axis trending from northwest to southeast with a diameter of 2.2 miles as measured on the cap rock. Depth to cap rock was found as shallow as 591 ft. and salt as shallow as 1,160 ft.

Commercial oil production was first obtained during February 1929 by Humble Oil & Refining Co. 6 Sterling in the Marginulina-Frio series at about 5,850 ft. The discovery marked the fifth stepout in a straight line from the crest of the dome and only after 22,189 ft. of bore hole had been cut in six successive attempts



Map of Moss Bluff shallow piercement-type salt dome of Liberty County, Texas, where British-American Oil Producing Co. has revived oil production after the field had been abandoned for the past 17 years. (Subsurface geology after J. Brian Eby and R. P. Clark).

separated from previous tests by 100 to 500 ft. of surface distance. Gulf offset the discovery to the north and drilled two producers. The northeast flank was proven productive by Humble 4,400 ft. on the periphery north of the discovery. Productive were sand stringers in the upper 200 ft. of the Marginulina-Frio series of Oligocene age lying at depths ranging from 5,500 to 5,860 ft. Production declined and the field was abandoned during 1933 after only 179,235 bbl. of 30°-32°-gravity oil was produced from these four flank oil wells.

Subsurface study.—Last year, Dillard & Walterman drilled a 9,002-ft. dry hole about 800 ft. east of the abandoned east-flank oil wells drilled by Gulf. E. L. Earl, British-American Oil Producing Co. district geologist at Houston, made a study of well logs drilled on the east flank of the dome and recommended that a deal be made with Dillard et al. to drill a Marginulina-Frio sand test.

British-American staked its "A"-1 W. P. H. McFaddin et al., 330 ft. from the south line and 7,300 ft. from the east line of the lease, but only 200 ft. updip from an abandoned flank oil well. The "A"-1 McFaddin was drilled to a total depth of 6,572 ft. by Bass Drilling Co. tools and the 5½-in. oil string set and cemented at 6,335 ft. with 300 sacks. Casing was perforated from 5,856-64 ft. in a 23-ft. sand section logged from 5,855-78 ft. On initial flow test, it tanked 64 bbl. of 30°-gravity oil in 15 hours through a 7/64-in. choke with a flowing tubing pressure of 725 psi.

Paleontological record discloses the following tops: Discorbis, 5,280 ft.; Eponides, 5,428 ft.; Heterostegina, 5,489 ft.; Bolivina perca, 5,520 ft.; Marginulina (round), 5,581 ft.; Textularia mississippensis, 6,430 ft.; Nodosaria blanpedi (in basal Frio), 6,461 ft.; and Textularia tumidula (top of Vicksburg?), 6,510 ft.

Other reservoirs. — Oil showings are reported to have been logged in the Discorbis zone and in the Heterostegina lime of the middle Oligocene series. (The producing reservoir lies about 200 ft. from the top of the Frio series.) Other sands in the Frio which indicated water on the electric log may produce oil updip, one major company geologist stated.

A statistical summary of flank development to date including the new "A"-1 McFaddin oil well indicates that 133,418 ft. of formation has been drilled as follows:

Depth classification—	Number of wells in each class	Footage in each class
4,000-5,000	1	4,692
5,000-6,000 (Frio objective)	9	51,040
6,000-7,000 (Frio objective)	7	44,349
7,000-8,000	1	7,375
8,000-9,000	2	16,960
9,000-10,000	1	9,002
Total number of flank tests	21	133,418

Salt-Dome Faults

Houston geophysicist has hypothesis for origin

HOUSTON.—The salt-ridge hypothesis for the origin of the unusual type of medium to low-angle normal faulting characteristic of the salt-dome province of the Gulf Coast was advanced here before the Houston Geological Society by Miller Quarles, of United Geophysical Co. of Houston.

Quarles reviewed three major hypotheses as follows: subsidence of the basement rock toward the Gulf, slipping of sediments down dip towards the Gulf on a bedding plane, and vertical intrusion of salt in the form of long ridges roughly paralleling the Gulf Coast.

The speaker believed that the latter hypothesis was the only one that adequately explains the following Gulf Coast fault characteristics that are found on seismograph cross-sections: medium to low angle of dip, both up-to-the-coast and down-to-the-coast movement in the same locality, adjustment faults forming narrow grabens, dipping down of beds into the down-thrown side of the fault, dipping up of beds under the upthrown side, great increase of throw with depth, rapid dying-out of faults laterally, localized throw across fault with no relative displacement of beds a mile or more away, and a decrease with depth in the amount of dip down into the downthrown side of the fault.

The salt ridge hypothesis, Quarles said, assumes that a ridge of salt pushes up the gulfward dipping beds along their strike to form deep-seated anticlines below every fault or fault zone. The term "edge syncline" was introduced for the depressions that may parallel the ridges as a result of salt removal.

The presence of salt ridges would require that new concepts be used for locating deep oil fields, and would multiply the number of favorable structures.

Paper discussed. — Stuart K. Clark, Continental Oil Co., Houston, in discussing the paper, urged that conclusions be limited to "what is possible mechanically." Faults, he termed, are "shearing failures of the earth's crust and as failures are subject to the laws of mechanics." He supported the fact that the dips toward the fault plane shown on seismic cross-sections are "not drag, but dips that are real."

"Vertical forces," Clark added, "are all that are necessary. Diagonal shear is the result of vertical compression."

Dr. L. L. Nettleton, geophysicist, Gravity Meter Exploration Co., Houston, advocated a combination of both the salt ridge and the slipping-plane hypotheses and stated that "I still believe that the sliding of sediments downdip towards the gulf has a place in this analysis."

MID-CONTINENT

Oil and Gas Group Elects

T. H. Marshall, executive vice president of Anderson-Prichard Oil Corp., Oklahoma City, was named president of the Oklahoma-Kansas Division of the Mid-Continent Oil and Gas Association at an election meeting in Tulsa this week.

Other new officers include: D. A. McGee, Kerr-McGee Oil Industries, Inc., Oklahoma City, vice president for western Oklahoma, succeeding W. R. Wallace; and Ward Merrick, Ardmore, Okla., independent oil operator, vice president for southern Oklahoma, replacing the late Lloyd Noble.

Officers reelected were: Villard Martin, Tulsa attorney, first vice president; H. E. Zoller, Derby Oil Co., Wichita, vice president for western Kansas; Carl Weiner, Chanute, Kans., vice president for eastern Kansas; A. W. Ambrose, Cities Service Oil Co., Bartlesville, vice president for northern Oklahoma; and Clarel Mapes, secretary-treasurer.

CANADA

New Alberta Discovery

CALGARY.—A wildcat drilled by Calgary independent in the Barons area on the southwest plains of Alberta Province has resulted in an oil discovery.

The well, 200 miles north of Barons, is Barons Oil, Ltd., 1, in LSD 10, 15-12-23w4, which is producing 32.5°-gravity oil from 4,105-14 ft. The discovery follows by a few weeks Canadian Gulf Oil Co.'s discovery of D2 and D3 Devonian oil at Big Valley, 138 miles north of Barons and 18 miles south of Gulf's Stettler Devonian oil field. Barons is about 80 miles southeast of here, while Big Valley is 80 miles northeast. In between is a broad stretch of prospective oil and gas territory which hasn't experienced exploration approaching the scale of that around the Edmonton district. Big Valley and Barons will influence exploration of this belt.

In leasing activity, there were 214,177 acres of Alberta Government Reservation lands issued during the week ended November 23. Crown lands were taken up by Canadian and American oil firms and individuals carrying out exploratory and development work in the province. The week's largest single spread was acquired by Sun Oil Co., Ltd., in the northwest sector of Alberta, about 400 miles northwest of Edmonton. The new reservation, located in the Steen River area about 95 miles northwest of Fort Vermilion, covers 99,937 acres.

Co-Op Comeback

Better earnings for petroleum cooperatives enables them to recover after 'toughest competitive battle in years'

Bertram F. Linz

WASHINGTON. — Petroleum cooperatives this year are gradually recovering from what they say frankly was "the toughest competitive battle in years" which in 1949 brought the earnings of many of them down almost to the vanishing point.

High crude costs and low product prices are advanced as the reasons for the sharp cut in earnings in 1949, but some cooperative spokesmen admit the failure of the general run of cooperatives to keep abreast of developments in refinery techniques also was a factor in some instances. The level of efficiency is now being raised and five catalytic cracking units have been installed or are now being built in cooperative refineries. A drive has also been started to educate co-op governing boards—usually composed of "dirt farmers" interested chiefly in agricultural production rather than manufacturing—in the necessity for maintaining high standards of competence in manufacturing operations.

A dozen.—There are about a dozen cooperatives interested in oil activities, the most important being Consumers Cooperative Association of Kansas City, Mo., which, incidentally, operates as a corporation and does not take the exemptions granted farmer cooperatives by the tax laws.

Other major petroleum cooperatives are the Farmers Union Central Exchange, St. Paul; Midland Cooperative Wholesale, Minneapolis; Ohio Farm Bureau Co-op Association; Indiana Farm Bureau Co-op Association; Missouri Farmers Association; Consumers Co-ops Associated, Texas; Illinois Farm Supply Co.; Utah Cooperative Association; and, more recently, Farm Bureau Services, Michigan, and Pacific Supply Cooperative, Washington. There is also a National Cooperative Refinery Association, composed of Farmers Union Central Exchange, Consumers Cooperative Association, and Midland Cooperative Wholesale, together with Central Cooperative Wholesale, Superior, Wis., and Farmers Union State Exchange, Omaha.

These organizations own more than 1,000 oil wells, more than 1,000 miles of pipe line and over a score of refineries with a daily capacity of something over 130,000 bbl. daily.

C.C.A.—Consumers Cooperative Association (C.C.A.) alone drilled 60 wells in 1949, and had 1,055 producing wells and an output of 4,186,818 bbl. for the year. It had two rotary drilling rigs in operation, and maintained 957 miles of pipe line in Oklahoma, Kansas, and Nebraska, of which 714 miles were gathering lines. C.C.A. reported it had 181,000 acres of oil land under lease in Kansas, Colorado, Indiana, New Mexico, Texas, Illinois, Montana, Oklahoma, and Wyoming. It processed 7,182,288 bbl. of crude in its own refineries, and was planning further expansion.

C.C.A. offers a good case history of the experience of petroleum cooperatives generally. Reporting to its stockholders on 1949 operations, C.C.A. explained that in the petroleum end of its business the postwar readjustment was "fast and severe," the supply situation reversing itself almost overnight from one of scarcity to one where ample supplies were available. Other factors were an unusually mild winter and increased imports of foreign oil and products.

Make $2,000,000.—C.C.A. made nearly $2,000,000 in crude-oil production during the year, but lost money on refining. The organization is involved in a number of lines of manufacture and distribution which are affected by the drop in wholesale prices, and its earnings for the year on a $55,000,000 business were but 1 per cent of what they were in 1948 on $54,000,000 of business—$86,334 compared with $8,019,159.

The disinflationary trend made its appearance in 1948 and many cooperatives lost their sources of crude supply or found themselves squeezed between high crude and low product prices, and took steps to protect themselves.

Three regional wholesales—Pennsylvania Farm Bureau Cooperative Association, Cooperative G. L. F. Exchange, and Southern States Cooperative—joined in the purchase of a controlling interest in a petroleum refinery and topping plant in Texas with an expected capacity of 30,000 bbl. daily, and formed a corporation, Petrol Refining, Inc., which bought three tankers to bring in crude from Venezuela and move domestic refined products.

Another group. — Another group—Midland, Farmers Union Central Exchange, and Illinois Farm Supply Co.—acquired a substantial interest in five refineries, four in Texas and one in Louisiana, with a combined daily capacity of 22,500 bbl., from Premier Petroleum Co. Illinois Farm Supply Co. bought a 4,000-bbl. refinery at Pana, Ill., and the Indiana Farm Bureau Cooperative Association completed an expansion program which increased the capacity of its

Man-Made Tornado

This is not the exhaust from some super-duper jet engine, but the end of a section of Pacific Gas & Electric Co.'s 34-in. natural-gas pipe line from the Arizona-California border to San Francisco during purging operations. The line was cleaned out with gas from Texas (1,600 miles away) to rid it of debris which collected during construction. Gas was pushed through the line at the rate of a mile a minute, and at a force equal to that of a tornado or a shell from a 155-mm. Howitzer.

XUM

Mount Vernon, Ind., refinery from 2,000 to 8,000 bbl. a day and the capacity of its cracking plant from 2,500 to 3,500 bbl.

Because of the threatened shortage of products, the Farm Bureau Services, Michigan, authorized its wholesale to take steps to obtain a source of crude supply; the Farmers Union State Exchange, Nebraska, and the Utah Cooperative Association also lost their sources of oil supply, the latter buying a 700-bbl. topping plant at Jensen, Utah. Midland Cooperative Wholesale bought leases on Oklahoma land with 100 producing wells and a first call on any additional production obtained, and Pacific Supply Cooperative changed over to a corporation to permit the financing of expansion into production of petroleum products.

Relatively strong.—As a result of such moves and a general tightening up of operations, the petroleum cooperatives on the whole are today in a relatively strong position, but cooperative officials do not believe the number of organizations will increase to any extent during the period of the defense program, at least.

The question of tax exemption, long a subject of bitter controversy between "conventional business" and the cooperatives, does not appear to worry the latter to any great extent. Less than half of the farmer cooperatives—48 per cent—take advantage today of this exemption, the remainder operating as ordinary corporations. This exemption is given only to farmer cooperatives, 80 per cent or more of whose sales are to members, and consumer cooperatives in general are not eligible.

The question of eliminating this exemption, which consists of freedom from the corporation tax, has been before Congress frequently. During the consideration of this year's tax-increase bill the matter was brought up but Treasury officials indicated the amount of tax which would accrue from elimination of the exemption was so small the change was not worth the bother.

Amount of tax.—There is a big difference of opinion over the amount of tax that could be collected by taking the cooperatives' tax advantage away. Proponents of tax equality have charged that the cooperatives escape tax on something like $3,000,000,000 of business, but cooperative spokesmen assert that this figure represents the business done by all cooperatives, farmer and consumer, lumped together and the amount that would be collected from the few organizations now exempt would run in the neighborhood of only $1,000,000. Further, they say, the exemption is so minor and the restrictions so severe that cooperatives are gradually drifting away and transforming themselves into corporations.

I.C.P.A.—There is one more cooperative of interest to the domestic oil industry although it does not operate in the United States. This is the International Cooperative Petroleum Association formed after the last war largely through the efforts of Howard A. Cowden, president and general manager of Consumers Cooperative Association.

Five new members joined the I.C.P.A. during the past year, bringing the total of 21 cooperatives in 13 countries. Despite increasing barriers to world trade, the organization tripled its sales over 1949, with sales last year just under $2,000,000 and net "operating savings" of $51,095. These savings, however, were little more than one-third those of 1949 because of smaller "patronage refunds" from C.C.A., which gets much of its lubricating oils and some of its refined oils from I.C.P.A.

I.C.P.A. now has sufficient members to finance crude production, operate refineries, and transport by pipe line and tankers on a global basis, it was reported at the last annual meeting, in Helsinki, Finland, and will do so as soon as the necessary finances and supervision can be secured.

TECHNOLOGY

Vanadium Vandalism

Data reveal that use of agent in residual fuel oil contributes to furnace, boiler corrosion, A.S.M.E. Told

George Weber

NEW YORK.—A serious corrosion problem affecting the future use of residual fuel oil received close attention at the seventy-first annual meeting of the American Society of Mechanical Engineers this week. The petroleum industry's interest was directed primarily to a timely panel discussion of the causes and possible prevention of metal corrosion encountered in high-temperature combustion of No. 6 fuel oils containing vanadium.

While definite evidence is not yet at hand to prove that vanadium is the actual corrosive agent in heavy fuel-oil ash, enough data have been accumulated to point to that element as clearly contributing to the serious damage in many modern furnaces and boilers. This type of corrosion which has proved especially serious in some recent cases, is nothing new. It was known or suspected over 10 years ago. But two factors have brought it sharply to the attention of combustion engineers recently. The adoption of higher furnace temperatures, at which such corrosion begins, coupled with the increased use of residual fuel oil replacing solid fuels, have combined to make the problem much more widespread than formerly.

Further, the new interest in gas turbines adds still another field in which this type of metal corrosion is giving trouble. The A.S.M.E. meeting provided a clearing house for data on such corrosion studies, and held out the promise of solution in some of the research work now under way.

Accepted theory.—E. F. Tibbetts, metallurgical engineer for Lummus Co., referred to the commonly accepted theory that vanadium occurring in residual fuels is the cause of the alarming metal corrosion resulting from exposure of metal surfaces to heavy fuel-oil ash at temperatures above 1,000° F. He concluded that although high vanadium-content ash is most troublesome, residual oils containing vanadium can be burned in a majority of existing installations without difficulty, particularly if precautions are taken to insure good combustion conditions. For those applications where design demands that oil ash pass over metal surfaces at elevated temperatures, such as in gas turbines, Tibbetts conceded that difficulties may be expected in burning residual oils, particularly those high in alkali and vanadium. He pointed to the additive approach as being the most promising at present for a practical economic solution to the problem.

Investigation reviewed.—Dwight Douglass, superintendent of power for Hartford Electric Light Co., reviewed a well-conducted investigation of the extent of pitting and worm-tracking of furnace-wall tubes under various conditions of operation. While little is yet known of the mechanics of such corrosive attack, his data pointed to vanadium as the culprit. Improved combustion conditions, reduction of flame impingement, lowered metal-surface temperatures, and selection of higher grade fuels containing less vanadium—all resulted in slowing but not halting corrosion. Engineers of the Connecticut utility company experimented with the introduction of a commercial powdered diatomaceous earth with the burner air stream in an effort to inhibit the attack through formation of a different type of ash having a higher fusion temperature. This proved of no benefit.

Two possible solutions.—The company is now supporting research work on

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two possible solutions. One concerns the use of fuel additives which will inhibit the harmful constituents of the oil directly, or raise the melting point of oil ash above a plastic state at operating-metal temperatures. The other project is approaching the problem from the standpoint of protective coatings. Currently the latter study concerns metallic coatings. A 25 per cent chrome overlay on samples of alloy tubing show a ten-fold increase in resistance to corrosion under controlled laboratory conditions. The mechanics of applying this type of coating are yet to be determined, Douglass reported.

Type of attack.—The results of General Electric Co.'s 2-year experience in investigating heavy fuel-oil-ash corrosion indicates that the type of attack that is found on metals above 1,000° F., subject to No. 6 fuel-oil firing, is associated with the presence of vanadium in the fuel. Data are still required to completely confirm this, O. L. Wood of G.E.'s construction engineering division, said. Attack of this type can be traced back as far as 1933. However, the recent trends toward more efficient power generation at higher temperatures plus the swing to No. 6 oil have greatly multiplied the instances of such corrosion.

It should be emphasized, Wood said, that vanadium oxide may not of itself cause the attack, but its presence or action with other ingredients may produce the corrosive tendency of this oil. The kind of attack varies with temperature, proximity of the flame, and the resulting combination of vanadium and other ingredients in the oil during combustion and deposition on the surface of the metals exposed to it.

Little hope. — Wood holds out little hope for eliminating corrosion by adoption of improved metal alloys. While different alloys show varying resistance, it appears from laboratory tests and field experience that no known high-temperature alloy steel will completely withstand the attack of vanadium-bearing fuel-oil ash. It was agreed that the exact form of vanadium in oil is not yet known. A certain proportion, Wood said, appears to be as vanadium pentoxide (V_2O_5) crystals in suspension. These can be separated from fuel oil by centrifuging. About 50 per cent appears to be chemically combined in the oil with no known economic means for separation. Certain characteristics of vanadium oxide are cited as probable bases for its severe attack. They include: low melting point, solvent action, a low temperature vapor phase, a catalytic action, and its ability to release oxygen. Pure V_2O_5 melts at 1,274° F. and its combination in fuel-oil ash with larger amounts of higher-fusion ingredients produces a low melting point eutectic, so that with certain impurities, V_2O_5 has been found to melt as low as 977° F.

Sulphates, too. — Some of the sulphates present in ash, particularly sodium sulphate, may be the real corrosive agents, he reported. However, vanadium still appears to contribute to the problem, since sodium sulphate alone, which melts at 1,660° F., could not have caused corrosion at lower temperatures unless its mixture with vanadium compounds depressed the melting point of the mix.

General Electric has been actively working on the problem in laboratory and field for 2 years. Its stake in the gas turbine makes it an important research project. Several additives including the oxides of aluminum, titanium, iron, and calcium, and pulversized coal flyash have been found to reduce or greatly retard the corrosive attack. Some were of the type to raise the melting point of the vanadium-bearing fuel-oil ash, thereby stopping its fluxing action at operating temperatures. Fuel and combustion-air additives have been used in actual furnace runs and detailed reports on this work are now in preparation.

Next step. — The next step involves testing laboratory results in large operating furnaces to secure conclusive field data. Two such projects are now under way, Wood said, but many more are needed for confirming data and a final answer to this corrosive problem.

C. F. Kottcamp and L. O. Crockett, of Gulf Oil Corp., Pittsburgh, in a comprehensive report to mechanical engineers, reviewed the economics and methods of No. 6 fuel-oil manufacture. Against this background, they emphasized the limits to which this essentially byproduct fuel may be further refined for trouble-free use in gas turbines and high-temperature furnaces, without raising its cost to such a level as to offset its current economic advantage as a low-priced fuel. Demands on the part of gas-turbine manufacturers for chemical or physical separation of vanadium might upset the principal economic justification for gas turbines, which today rests heavily on the fact that they can utilize a lower-cost fuel than diesels and other internal-combustion engines.

Practical approach.—In the same respect, the Gulf engineers called for a practical approach in the writing of specifications for No. 6 fuel oil for gas turbines. They pointed to the fallacy of specifying a maximum limit for computed V_2O_5 in the ash. This would discourage beneficial centrifuging which would raise the vanadium-pentoxide content simply by reducing the ash content of the oil, and would further permit meeting maximum vanadium-percentage limits by adding to the ash content of the fuel oil. Maximum allowance of vanadium expressed as a percentage of oil was suggested as more realistic. They agreed with other engineers in suggesting that the use of additives promised the most practical means of reducing the corrosive tendencies of vanadium.

Other topics of petroleum interest, among the more than 250 papers presented at the week-long meeting, concerned orifice meters, experience with austenitic steels in the petroleum industry, pipe thickness formulas, high-pressure viscosity of lubricating oils, and properties and performance of two classes of synthetic lubricants.

MEETINGS

P.E.P.A. Elects Officers

HOT SPRINGS, Ark.—R. E. Patrick, Kansas Gas & Electric Co., Wichita, was elected president of the Petroleum Electric Power Association at the group's twenty-second annual meeting at the Arlington Hotel here this week.

Representatives from 24 electric-utility companies who make up membership in the P.E.P.A. attended the meeting.

Other officers elected include: T. E. Graham, Oklahoma Gas & Electric Co., Oklahoma City, vice president; and Ned W. Beaudreau, Central Power & Light Co., Corpus Christi, secretary-treasurer.

A number of papers dealing with electrification in the petroleum industry were presented to the 100 representatives. Among them was a paper on electrical - equipment installations in the Smackover field of Arkansas, by C. W. Chachere, electrical engineer with Gulf Refining Co., Shreveport.

Another paper of interest to the oil industry was "Supervisory Controls for Pipe Lines," by William A. Deer, supervising engineer for Westinghouse Electric Corp., East Pittsburgh, Pa.

Tax Forum to Meet

DALLAS.—State and local tax trends of unusual current interest to oil-company tax representatives are to be covered on the agenda of the 1950 ad valorem tax forum of Mid-Continent Oil and Gas Association to be held December 6-8 in Dallas, according to Chairman J. W. Elder, Ohio Oil Co., Findlay, Ohio.

All sessions of the forum will be held at the Adolphus Hotel and will feature nationally known tax experts as speakers. The annual event is sponsored by the association's state and local taxation committee which also arranges the program and supervises the agenda.

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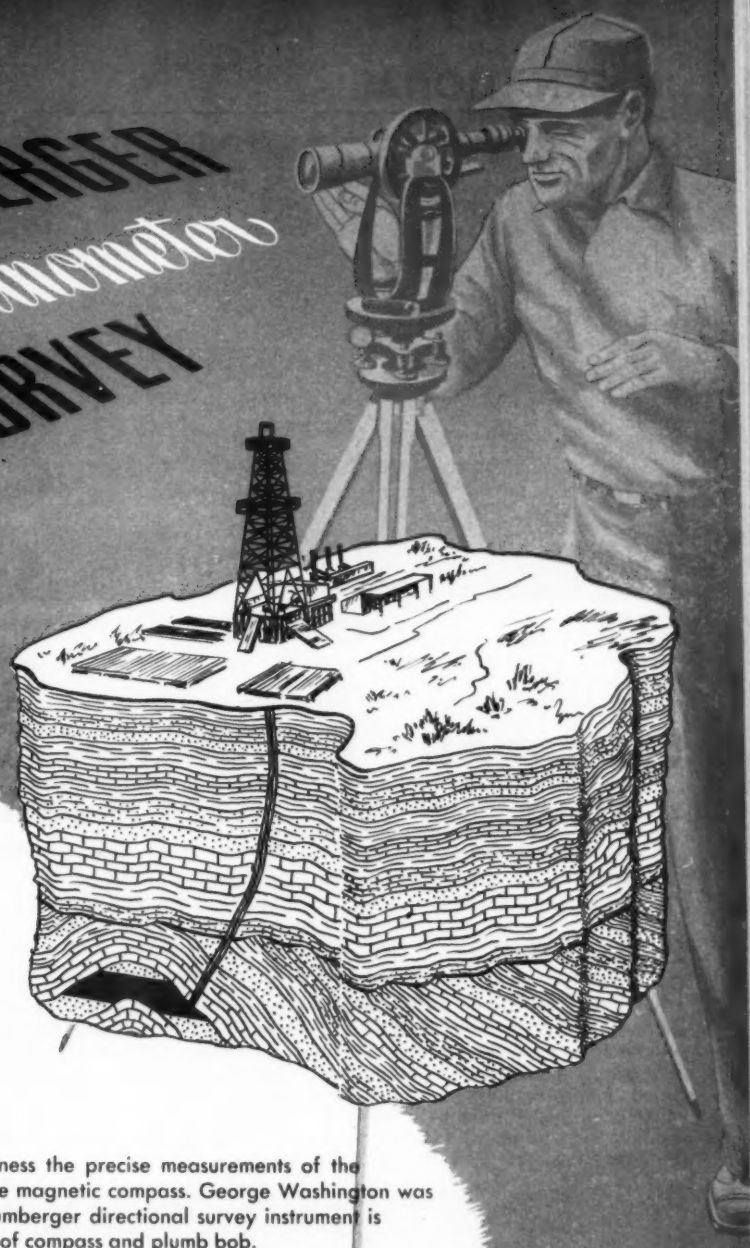

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XUM

General view of the new Spanish refinery which will soon be expanded.

EUROPE

Cartagena Expansion

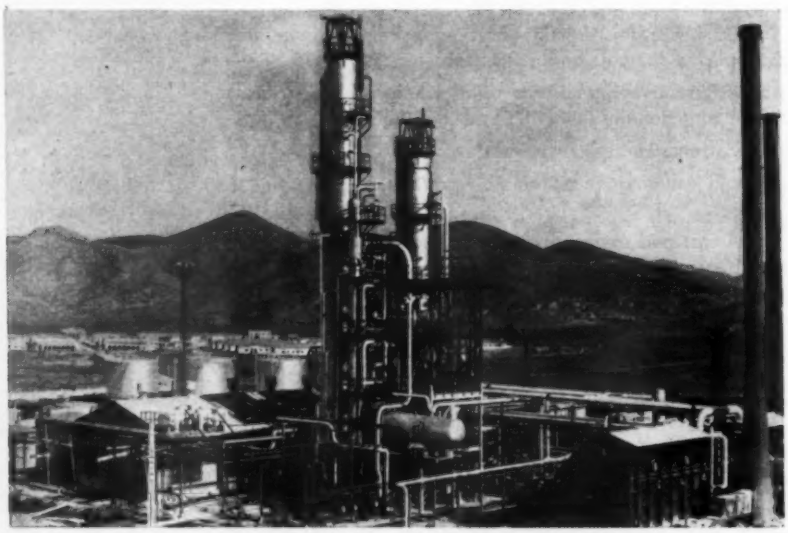
Capacity of only refinery on Spanish mainland may be increased to 30,000 bbl. daily with new installations

Dahl M. Duff

PLANS are being made for a further substantial expansion of the Cartagena, Spain, refinery of Refineria de Petroleos de Escombreras, S.A., which went into initial operation early this year.

Original plans made last year called for a refinery with a daily capacity of 20,000 bbl., with lubricating oil, reforming, and polymerization facilities, to be completed by April 1952. The plant charged 5,000 bbl. daily when it went on stream January 15, and work has been continuing on the enlargement.

Decision has now been made to increase capacity of the refinery considerably beyond the 20,000 bbl. daily originally planned. While the exact amount has not yet been definitely set, a further increase by possibly 50 per cent to 30,000 bbl. daily total throughput is being considered.



Two-stage distillation unit at the Cartagena plant.

The company, known as REPESA, was organized in June 1949 to take over, complete, and expand a partially finished Spanish Government refinery project. The Spanish Government agency, Instito Nacional de Industria, holds 52 per cent interest, and California Texas Oil Co., Ltd., and the Spanish company, Cia. Espanola de Petroleo, S.A., 24 per cent each.

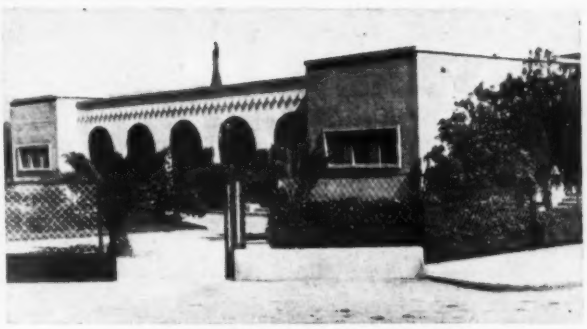
W. F. Bramstedt, president of Caltex, said that a resurvey of Spain's future petroleum products needs had prompted the move for the additional expansion of the facilities at Cartagena. He said that the operations in Spain had worked out successfully and that the relations begun at the time of the initial negotiations "created a feeling which will unquestionably result in a satisfying outcome for our investments in Spain."

The refinery is located at Escombreras, just outside Cartagena, in what was formerly a barren valley. In 1944, before any work at all had begun on the refinery, there was virtually nothing in the valley, and Bramstedt pointed out that wharves, water supply, roads, houses, power, workshops, and other facilities all had to be built under quite difficult conditions.

Equipment.—Equipment provided in the original program and which will be built during the next 18 months includes an atmospheric distillation unit, a thermal reformer, a catalytic polymerization plant, and complete facilities for the manufacture of automotive and industrial lubricants. Definite plans and design for the further second-stage expansion have not yet been made.

The lubricating-oil plant, at present in the preliminary stage, would have an annual capacity of 20,000 tons (about 400 bbl. daily) of products.

Classification tankage at Cartagena.



Exterior of the refinery cafeteria.

The crude distillation unit with a capacity of 20,000 bbl. daily will have a gasoline rerun column and stabilization. About 6,000 bbl. daily is now being run in the two-stage unit, the entire operation consisting of distillation and treating.

The reforming unit, designed to improve octane number and volatility of the heavy straight-run gasoline, will have vaporized clay facilities. The recovery of C_3 and C_4 olefins for feed to the catalytic polymerization unit and stripping the residue to improve gasoline fractions will be carried out.

This unit is being designed to handle 6,000 bbl. daily when reforming 210°-400° F. heavy gasoline to produce the debutanized 400° F. endpoint gasoline. This will have a clear octane number of 70 (A.S.T.M. motor method). Color improvement will be done through the use of Gray towers. The polymerization unit will process 350 bbl. daily.

Mainland's first.—The Cartagena refinery is the first built on the Spanish mainland. Outside of the small production of a shale-oil distillation plant in south central Spain at Puertollano, the country heretofore has been entirely dependent on imported products. The Spanish partner in the Escombreras company, Cepsa, operates a recently expanded refinery of more than 15,000 bbl. daily in the Spanish Canary Islands, and its production has partially met the requirements for products in Spain itself.

Spanish authorities expect that the new refinery will play an important part in plans for industrialization and economic transformation of the country. REPESA President Jose M. de Lapuerta estimated that Spain would save around $8,000,000 annually in foreign exchange from the operation of the Escombreras plant.

Imports.—Last year imports of petroleum products into Spain exceeded those imported the previous year by about 19 per cent. About 32 per cent of the total comes from the Netherlands West Indies, with Saudi Arabia, the second main supplier, furnishing about 25 per cent. Total imports from foreign sources and from the refinery at Tenerife in the Canary Islands averaged about 23,000 bbl. daily.

Though the United States supplied only 4.2 per cent of Spain's total petroleum imports in 1949, 97 per cent of all the lubricants used in the country come from the United States. Last year, Spain was forced to curtail allocations of dollars for the import of packaged lubricants, and the amount imported was considerably reduced.

Caltex has pointed out that its investment in the Spanish refinery is entirely its own and no U. S. Government funds are involved. When the joint company was first announced, the arrangement was said to mark the first time American capital had participated in major development in Spain. In the deal, Caltex extended dollar credit for the necessary equipment for the refinery, and in return received a 15-year preferential right to supply one-half the crude to be processed. Caltex also is understood to have received certain guarantees for the dollar remittance of its dividends.

LATIN AMERICA

New Colombian Oil Law

Sweeping decree law promulgated by government meets virtually all objections which have barred exploration

A SWEEPING new decree law promulgated by the Colombian Government has met virtually all the principal objections which have been made by the industry to the legal difficulties of exploration in that country.

The new measure goes farther than the decree law issued last January which made some changes in Colombia's petroleum law of 1931 and 1936. With the new set of amendments, the government has completed the work of removing the major legal obstacles which were a contributing factor in the decline of exploratory work 1½ years ago.

Most important of the changes made by the new decree are those opening up reserve areas of the country and allowing an operator to surrender a concession within the first 3 years of the exploratory period without obligation to the government.

Like some other Latin American countries, Colombia has for years prohibited any oil exploration in the so-called reserve zones located in areas adjacent to the national boundaries. In Colombia, these included a 12-mile strip along the Pacific Coast, the area around the mouth of the Atrato River near Panama, and the Department of North Santandar and other sections in the Llanos region along Colombia's approximately 1,750-mile border with Venezuela.

Applications made.—Various companies in the past have made application for concessions in some of these reserve areas in the hope of a change in the law. The Colombian affiliate of The Texas Co., currently the most active company in exploration in the country, has had a long-pending bid for a part of North Santandar adjoining the Venezuelan border. The new change in the law will allow this concession, and the company is understood to be ready to proceed with an exploratory program in the area.

Along the Pacific Coast, the 12-mile reserve zone has in the past hampered operations and complicated transportation by requiring concessions to be kept back of this strip. It appears the chances of new activity along the Pacific Coast are better than in the more remote Llanos sections where some earlier exploration results were disappointing and where a successful operator would be confronted with the necessity of establishing sufficient reserves to

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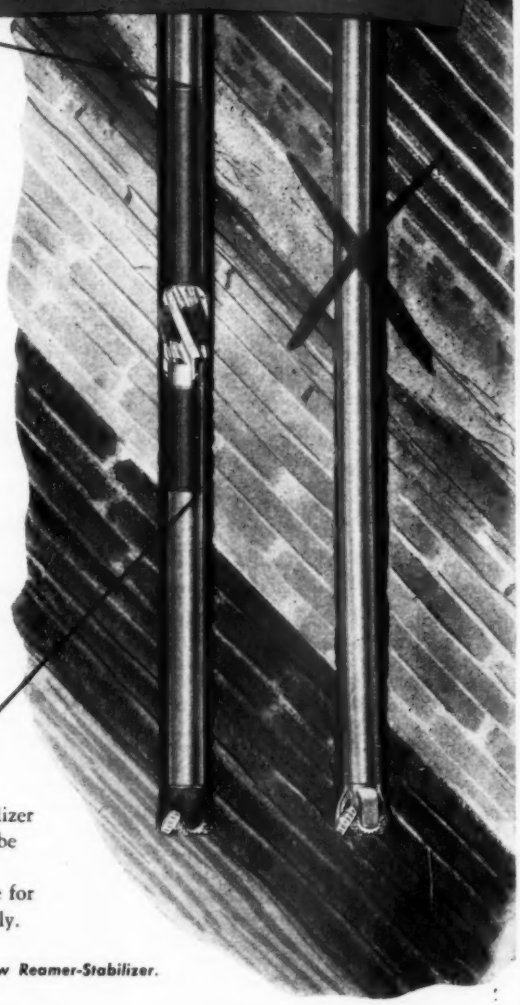

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New fee schedule.—Prior to this year, operators in Colombia were required to drill a test well within the first 3 years before they were allowed to surrender a concession. Last January's law provided the ministry of mines and petroleum could accept geological and geophysical evidence that the well was not warranted. The new amendment allows a concession to be surrendered during the first 3 years without either the well or the submission of geological and geophysical findings. Balancing this, however, is a provision for a 100 per cent increase in surface fees for the first 5 years in areas other than the Llanos. The new fee schedule for these areas now ranges from about 4 cents per acre for the first year up to 36 cents per acre in the fifth year.

These further changes in Colombia's petroleum law are in line with the program of the new government of facilitating continued oil exploration in the country by private capital. The new amendments come about 3 months after the appointment of Dr. Manuel Carvajal as minister of mines and petroleum under the new administration of President Laureano Gomez. The government's objective is to reverse the downturn in exploratory activities which in 1949 resulted in the withdrawal of several companies from the country.

Other changes.—Other changes made in the petroleum law by the new amendments include:

The requirement that contracts for concessions in national reserves must be approved by an act of the Colombian Congress is abolished.

A single established company in Colombia can now make application for and hold any number of concessions.

The initial exploratory period for the operator to make a wildcat location and spud a well is extended to 5 years. The well obligation, or alternatively the geological and geophysical evidence, is still required if the concession is held on into the fourth and fifth years.

The new schedule of surface fees during the first 5-year exploratory period will be reduced by 50 per cent if one rig is maintained active in the concession.

When production is obtained and the commercial period of the concession begins, the annual fee is reduced to one-half of the fee provided in the schedule for that year previous to beginning pipe-line shipments. Previously, the fee during the commercial period was set at about 61 cents per acre per year.

Survey requirements.—A survey of the concession boundaries is required only in the sixth year instead of within the first 3 years.

The ministry is authorized to waive the obligations of the time periods in concession contracts in cases where this is considered desirable.

The change allowing a single company to hold any number of concessions will make it unnecessary for companies to follow the practice of the past to create affiliates to hold additional areas. The previous provision limited a single company to two concessions, and as a result each major operator was forced to organize a number of subsidiaries.

The changes made in the law last January were welcomed in the industry but they were considered not to have gone far enough. They provided for easing some of the taxes levied on this industry in Colombia, increasing depletion allowances, and providing deduction of exploration expenses *(The Oil and Gas Journal, January 19, 1950, page 38)*. Both the changes in January and the new amendments were accomplished by decree laws which are effective at once though they presumably must be approved when the congress meets.

Major problem.—With the legal difficulties to exploration removed by the new laws, the Colombian Government faces another major petroleum problem in its disposition of DeMares concession which expires and reverts to national ownership August 25, 1951. The 30-year concession held by Tropical Oil Co. runs out on that date, and what to do with this, the country's largest source of production, has been the subject of discussions for several years.

A decision by the government on operation of the concession after it reverts is expected in the near future. Although Tropical last year notified the government it is not interested in future participation, International Petroleum Co., Ltd., Tropical's parent company, is reported to have made an offer to operate the concession under a management contract and to loan the government $15,000,000 for modernization of the concession refinery which also reverts.

Another proposal is from a Colombian manufacturers' organization which would organize a mixed government-private capital company to handle the operation.

Venezuela Production Record

New crude-oil production records have been established in Venezuela, both on a weekly and a monthly basis.

During the week ended October 30, the Venezuelan industry produced an average of 1,619,980 bbl. daily. The previous weekly high was 1,614,800 bbl. daily the week ended October 9.

Production during the month of October averaged 1,611,542 bbl. daily. This was 25,506 bbl. daily above the previous monthly record in September.

Production by company during the week ended October 30 included: Creole 685,288 bbl. daily, Mene Grande 281,413 bbl. daily, Shell 529,139 bbl. daily, Socony-Vacuum 39,710 bbl. daily, and Richmond, 16,911 bbl. daily.

Chilean Discovery

Oil production found in Cerro Sombrero region

NEW oil production has been discovered by the Chilean Government's oil organization in the Cerro Sombrero area about 10 miles southeast of Cerro Manantiales field.

A second well completed on one of the several structures in the Cerro Sombrero area was reported to have been brought in flowing at a rate of about 300 bbl. daily. The crude was described as sweet and similar to the 39°-42°-gravity oil obtained in Cerro Manantiales.

Production from the new well is now being taken out by truck, but plans are being made to lay a line connecting the field with the line from Cierro Manantiales to the tanker shipping terminal on the Straits of Magellan at Caleta Clarencia.

The new successfully completed well in the Cerro Sombrero area was the second drilled on the structure. Several months ago, an earlier test produced, but subsequently sanded up.

Cerro Manantiales in Tierra del Fuego near the southern tip of Chile was discovered late in 1945 as the country's first production. Commercial production began last year, and about 1,500 bbl. daily are currently being produced. Chilean oil operations except marketing are handled by the new Empresa Nacional del Petroleo which took over the work formerly handled by the government's Corporacion de Fomento.

Extraction plant.—About 80 per cent of the materials have now been purchased for the new 30,000,000-cu. ft. capacity gasoline-extraction and stabilization plant to be built by ENAP.

Venezuelan Minister Named

Pedro Emilio Herrera has been appointed Minister of Development in Venezuela succeeding Manuel R. Egana. Reports from Caracas identified the new cabinet member as an engineer formerly associated with the public-works department at La Guaira, Caracas' port.

The new head of the ministry which deals most directly with Venezuela's oil industry was appointed in a complete cabinet reorganization. The changes accompanied the installation of German Suarez Flamerich, a civilian jurist and diplomat, as president of the governing junta succeeding Lt. Col. Carlos Delgado Chadlbaud who was assassinated 2 weeks ago.

PERSONALS

Pan-Am Shift

Diwoky to assume duties of Brown, named to PAD

ROY J. DIWOKY, executive vice president of Pan-Am Southern Corp., New Orleans, has been named by the company to take over the duties of the president during the absence of Bruce K. Brown, who last week was appointed deputy administrator of the Petroleum Administration for Defense in Washington. Brown is expected to remain in that post for at least a year.

Diwoky joined Standard Oil Co. (Ind.) in 1935, and after serving for 5 years in the firm's research department, was transferred to the manufacturing department. He rose to the position of assistant general superintendent of Indiana Standard's Whiting, Ind., refinery.

In June 1949 he was named executive assistant to the president of Pan American Petroleum Corp., a Standard of Indiana subsidiary, which later became Pan-Am Southern.

Moving to the New Orleans headquarters at that time, Diwoky has also served as a director of the firm. He was named executive vice president early this year.

George E. Crosby, formerly reservoir engineer for Stanolind Oil & Gas Co. at Lubbock, Tex., has joined Continental Oil Co. at Hobbs, N. M., as development and production engineer.

R. H. McCall, assistant district engineer for The Texas Co. at Liberty, Tex., has been transferred to Houston as division equipment engineer.

Roy S. Ottoson and **William J. Dennison** have been named to supervisory positions in the mechanical department of the Tide Water Associated Oil Co. refinery at Bayonne, N. J.

Harry E. Hartman has been named foreman in the oil-conservation department at Esso Standard Oil Co.'s Bayonne, N. J., refinery. In the same plant, **Thomas R. Mitchell** has been named welding foreman.

Glen A. Marsh, senior engineering assistant at the Standard Oil Co. (Ohio) Toledo refinery, has been appointed general maintenance foreman. In the same refinery, **Newton S. Bickle** has been named foreman of the pipe shop and **J. J. Bender** has been named senior engineering assistant.

J. Calvin Brown, engineer and patent attorney of Los Angeles, has been elected president of the American Society of Mechanical Engineers for 1951, succeeding **James D. Cunningham,** of Chicago.

John Wold, formerly Wyoming district geologist with Sunray Oil Corp. at Casper, has resigned from the firm to open offices there.

Dr. Robert Scholten has joined Sohio Petroleum Co. as research geologist for Montana, with headquarters in Casper.

George C. Grow, Jr., formerly geologist for Peoples Natural Gas Co., has joined Transcontinental Gas Pipe Line Corp. as manager of the underground gas-storage department at Newark, N. J. **John C. Papp,** formerly associated with J. R. Butler & Co. and Carter Oil Co., has joined the firm as reservoir engineer at Houston.

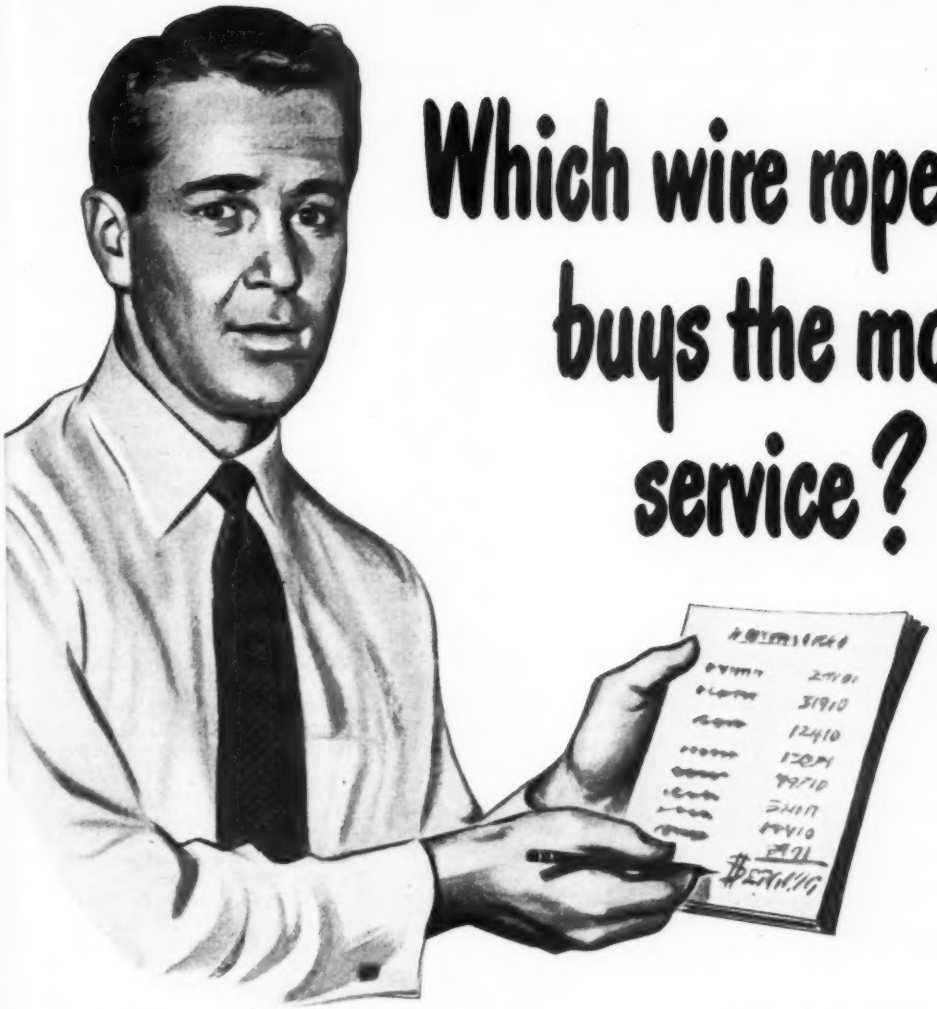
Malcolm P. Murdock has been appointed central region manager of Ethyl Corp. with headquarters in Chicago, succeeding **James E. Boudreau,** who has been named manager of sales marketing for the corporation.

F. B. Carter, assistant to the director of exploration for General Petroleum Corp., was elected president of the Pacific section of the American Association of Petroleum Geologists at the recent annual meeting in Los Angeles. Carter has been on General Petroleum's exploration staff since 1934 and was engaged in geological field work for 14 years before assuming his present post.

Jack Badger, scout for Tide Water Associated Oil Co. at Corpus Christi, has resigned effective December 1 to become scout for Deep Rock Oil Corp. at San Antonio.

O. C. Day and **S. F. Perrin** have been transferred to the petroleum-products division at Esso Standard Oil Co.'s Baton Rouge refinery. Day is division foreman in the cracking and hydro division, and Perrin is division foreman in the paraffin and lubricating division. **W. C. Clark** replaces Perrin as head of the petroleum technical service division with responsibility for all lube dewaxing and deasphalting and wax-manufacture work. **R. M. Eells,** engineer, has been transferred from the petroleum

Shell Oil Co. officials and members of the board of directors are shown prior to inspecting the company's properties in Ventura, Calif. Front row, left to right: Alexander Fraser, F. W. Woods, T. A. Morgan, Lewis E. Pierson, Lewis L. Clarke, and Gen. James H. Doolittle. Back row, left to right: Cason J. Callaway, P. E. Lakin, Dr. J. C. Hunsaker, S. F. Bowlby, H. S. M. Burns, and J. B. Black. The group also attended the official opening of Shell Development Co.'s expanded Emeryville, Calif., research laboratories.



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PERSONALS

technical service department to the equipment-inspection department in a similar capacity, and **B. J. Young,** engineer, has been transferred from the petroleum technical service to the process engineering department in a similar capacity.

Robert E. Kepke and **H. T. O'Neill** have been appointed directors of the newly formed Platte Pipe Line Co. which was formed as a joint venture between British American Oil Co., Ltd., and four major U. S. petroleum companies for the purpose of constructing a major pipe-line project. Kepke is vice president of supply and transporation for British American, and vice president of British-American Oil Producing Co. and the Toronto Pipe Line Co., British American subsidiaries operating in the United States. O'Neill is British American's vice president of finance. Both men are directors of the Portland-Montreal Pipe Line Co., in which British American has a 20 per cent interest.

Burns Crotty, formerly a staff geologist for Stanolind Oil & Gas Co., has joined Cabot Carbon Co.'s district office in Midland, Tex., as geologist.

Clarence Hughes, a scout for Carter Oil Co. at Denver, has been assigned to the Julesburg-Denver basin.

Homer C. Holder, party chief for Western Geophysical Co. of America, has been transferred from Christoval to Rock Springs, Tex., in the same capacity.

J. Howard Myers, of Atlantic Refining Co., Philadelphia, has been named chairman of a committee on wartime protection of petroleum facilities. The committee, approved at a meeting of industry leaders in Los Angeles recently, will be similar to that of World War II, and will include representatives of at least 20 companies.

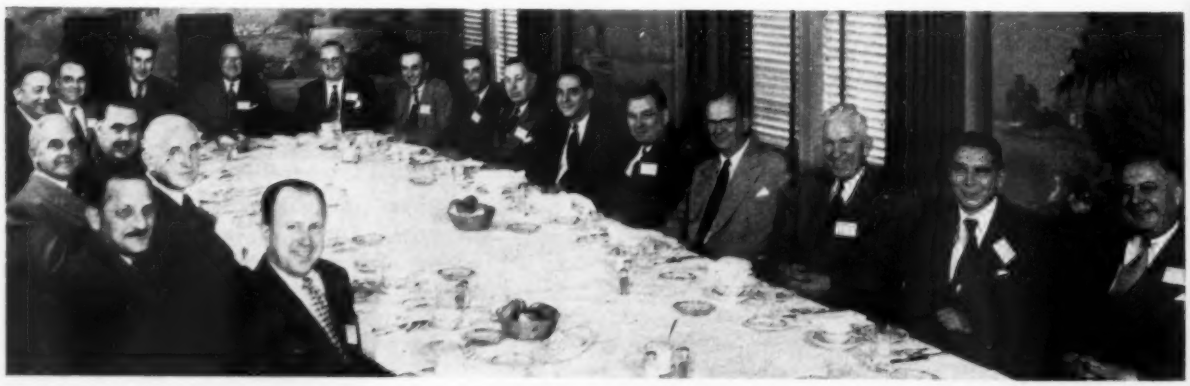
J. H. Russell, vice president in charge of the Houston division of the production department for Gulf Oil Corp., will head the newly established crude-oil-purchasing and pipeline departments. He will continue his headquarters at Houston, where he will have as staff assistants: **F. C. Anderson,** formerly with the Fort Worth production division; and **C. H. Osborne,** formerly with the production department in Pittsburgh. **R. D. McGranahan** will supervise the coordination of domestic and foreign crude supplies, and **W. J. Wilkins** will supervise the coordination of pipeline matters. **Ben C. Bolt,** vice president, will succeed Russell as head of the Houston production division. **R. W. McClenahan** has been transferred from the production staff to the president's staff to relieve **W. G. Moore,** assistant to the president, of part of his administrative responsibilities so that he may devote additional time to the study of special problems.

C. E. Meyer, of Springville, N. Y., recently retired vice president of Standard Vacuum Oil Co., Inc., has been appointed by the Economic Cooperation Administration to serve as mission chief in Korea, succeeding **Dr. Ralph Bunch,** now head of a special mission to Thailand. While affiliated with Standard, Meyer received most of his experience in the Far East, where he went in 1913, serving in Hong Kong, Canton, Foochow, Shanghai. In 1935 he was transferred to Japan.

H. K. Fitzgibbons, former student, has joined Husky Oil Co. at Denver as engineer.

Kenneth R. Joynt has been named assistant district superintendent of Magnolia Petroleum Co.'s Lake Charles district. He was formerly production foreman in the Falfurrias district. **James G. Sadler,** assistant foreman in the Falfurrias district, has been named production foreman there.

J. E. Cook, Ajax Pipe Line Co., and seven Interstate Oil Pipe Line Co. employes are on temporary loan to Trans-Arabian Pipe Line Co. in Saudi Arabia for 6 to 9 months during which they will get the big Tapline into operation and train native personnel to take over the jobs. The seven men from Interstate include: **Garrett B. Fisher, C. W. McSpadden,** and **W. E. Kent** of the Wewoka, Okla., district; **B. W. Manning, Jerry L. Thorpe, F. D. McCleskey,** and **P. E. Bradley** of the Wilson, Okla., district. Awaiting shipping orders for a delayed but definite departure are **Earnest C. James,** Wewoka district for Interstate; and **Joe Ben Holland,** of the Ajax company.



N.L.G.I. DIRECTORS.—New directors of the National Lubricating Grease Institute who were elected at the eighteenth annual meeting in Chicago recently are, left foreground, around the table: L. W. McLennan, director, Union Oil Co. of California, Oleum, Calif.; T. G. Roehner, chairman of technical committee (not a member of the board), Socony-Vacuum Laboratories, Brooklyn; H. P. Hobart, director, Gulf Oil Corp., Pittsburgh; J. R. Corbett, director, Cato Oil & Grease Co., Oklahoma City; H. A. Mayor, director, Southwest Grease & Oil Co., Wichita; R. Cubicciotti, director, L. Sonneborn & Sons, Inc., New York City; G. E. Merkle, new vice president, Fiske Brothers Refining Co., Newark, N. J.; C. B. Karns, new treasurer, Esso Standard Oil Co., Pittsburgh; A. J. Daniel, retiring president, Battenfeld Grease & Oil Corp., Kansas City, Mo., (continues as director); Harry F. Bennetts, executive secretary, Kansas City, Mo.; Howard Cooper, new president, Sinclair Refining Co., New York City; W. W. Albright, director, Standard Oil Co. (Ind.), Chicago; M. R. Bower, director, Standard Oil Co. (Ohio), Cleveland; H. L. Hemmingway, director, Pure Oil Co., Chicago; W. H. Oldacre, director, D. A. Stuart Oil Co., Chicago; W. H. Saunders, Jr., director, International Lubricant Corp., New Orleans; B. G. Symon, director, Shell Oil Co., New York City; P. V. Keyser, Jr., director, Socony-Vacuum Oil Co., Inc., New York City; and F. E. Rosenstiehl, director, The Texas Co., New York City.

PERSONALS

Orbie N. Lambright, seismic party manager for Cities Service Oil Co. at Lubbock, Tex., has been transferred to Big Lake, Tex., in the same capacity.

Robert F. Sawer, formerly gravity-meter party chief for United Geophysical Co., Inc., at Washington, Ind., has joined Petroleum Consultants, Inc., at Kimball, Neb., as seismograph surveyor.

Ira J. Meador, production engineer for Skelly Oil Co. at Monahans, Tex., has been transferred to Lindsay, Okla., as production foreman.

Darwin Quigley, Sinclair Oil & Gas Co., was elected president of the Intermountain Association of Petroleum Geologists at the annual election in Salt Lake City. Other officers include: **R. E. Landon,** president; **Richard R. Clawson,** Standard Oil Co. of California, treasurer; and **H. P. W. Donohoo,** University of Utah, secretary.

Paul S. Strain, chemical engineer for Standard Oil Co. (Ind.), has been transferred from Bethalto, Ill., to Wood River, Ill.

W. H. Pattison, Kansas area manager for Deep Rock Oil Corp., has resigned to enter the independent consulting field in Kansas and the Rocky Mountain province.

John Maxson, who resigned recently as Rocky Mountain manager for Anderson-Prichard Oil Corp., has formed Aerial Exploration Co. to map that region.

C. C. Book, superintendent for Republic Natural Gas Co., has been elected chairman of the Oklahoma A.P.I. chapter of Golden Trend. Vice presidents elected include: **H. J. Bourke,** Warren Petroleum Corp.; **W. S. McCrady,** Phillips Petroleum Co.; **Max Marstand,** Continental Supply Co.; and **G. G. McKenney,** Dowell Incorporated. **W. W. Wylie,** with Schlumberger Well Surveying Corp., is secretary-treasurer.

John W. B. Foringer has joined Lion Oil Co. as director of industrial relations in charge of all matters relating to personnel and labor relations, and to serve as administrator in union negotiations.

Don W. Redfern, Ohio Oil Co., was elected president of the newly organized Julesburg Basin Oil Scouts at the first formal meeting of the organization in Sidney, Neb. Other officers include: **A. J. Brown,** Shell Oil Co., vice president; and **Richard C. Frawley,** Sinclair Oil & Gas Co., treasurer. **Lynn C. Williamson,** Magnolia Petroleum Corp., and **Pete Crawford,** Phillips Petroleum Co., were made directors of the check.

H. H. ARNOLD, JR.

H. H. Arnold, Jr., division manager, Rocky Mountain division, producing department, The Texas Co., Denver, has been named assistant to the manager of the producing department and has been transferred to Houston. **Tom T. Freeman,** Denver, has been advanced from assistant division manager to division manager, Rocky Mountain division, succeeding Arnold, and **S. A. Berthiaume,** senior geologist at Houston, has been named assistant division manager, Rocky Mountain division, succeeding Freeman. Arnold joined Texaco in 1927, and was named Oklahoma division geologist in 1938, and division manager at Denver in 1948. Freeman joined the firm in 1922, and was advanced to assistant Rocky Mountain division manager in 1947. Berthiaume joined The Texas Co. in 1940 as subsurface geologist in the Gulf Coast area, and in 1950 was named senior geologist at Houston.

TOM T. FREEMAN

S. A. BERTHIAUME

Edward G. Koester, consulting geologist at Wichita, and **Frank A. Morgan,** vice president and manager of exploration for Richfield Oil Corp. at Los Angeles, are nominees for presidency of the American Association of Petroleum Geologists. Vice president nominees include: **John T. Rouse,** staff geologist for Magnolia Petroleum Co., Dallas; and **Lewis G. Weeks,** chief research geologist, Standard Oil Co. (N. J.), New York. For secretary-treasurer: **Robert H. Dott,** director of the Oklahoma Geological Survey at Norman; and **George C. Grow, Jr.,** manager of the underground gas-storage department for Transcontinental Gas Pipe Line Corp. at Newark, N. J. For editor: **Kenneth K. Landes,** department of geology, University of Michigan.

Hillard W. Bodkin, former district geologist for Superior Oil Co., has been named chief geologist for Tuley & Carter Drilling Co. at Evansville, Ind.

J. M. Moore, engineer on the staff of Dowell Incorporated, in the West Texas-New Mexico area, was elected chairman of the Permian basin section of the American Institute of Mining and Metallurgical Engineers for 1951. **Joe Chastain,** Bethlehem Supply Co. at Midland, was named vice chairman, and **Ray Ousterhout** of Odessa, Tex., with Dowell, was elected secretary-treasurer.

E. B. Wasson, geologist for The California Co., has been transferred from Vernal, Utah, to Denver.

D. E. Burroughs, general credit manager for Shell Oil Co., has been elected president of the American Petroleum Credit Association, succeeding **A. E. Fletcher,** general credit manager of Standard Oil Co. of Ohio.

DEATHS

Marvin T. Swinney, 55, employed by Gulf Oil Corp., died November 14 at Port Arthur, Tex.

Stuart F. Godfrey, Sr., 47, Bangor, Michigan drilling contractor and producer, died November 17.

W. Spencer Cook, 41, Southwest Michigan drilling contractor and producer, died in Grand Rapids November 21.

Albert Finston, 51, former vice president and general manager of Bell Oil & Gas Co. in Tulsa, died November 24 near Eufaula, Ala.

Willis Barton Smith, 60, production foreman for Amerada Petroleum Corp. at Odessa, Tex., died November 7 in Prescott, Ariz.

Harry A. Stendrup, 58, senior partner of Strendrup Oil Co., New York, died recently at Mineola, L. I. He had been with the oil business for 30 years, having spent 16 years with Sinclair Oil Co. and its foreign affiliates.

Walter Taylor Hay, 66, superintendent for 36 years of the Borne-Scrymser Co., grease and oil manufacturer of Elizabeth, N. J., died November 23 in Caranford, N. J.

E. Hazen Woods, geologist at Midland, Tex., for Sinclair Oil & Gas Co., died November 22 in Fort Worth.

XUM

"Packaged" Gasoline Plant Is

The plant here described permits a producer having a small gas volume to recover gasoline economically, and L.P.G. if desired, without hazard of large investment

LOW first cost, low installation cost, low operation cost, reasonable gasoline recovery, reasonable L.P.G. recovery if desired, and finally a high salvage value, are the features of a small portable gasoline plant recently placed in operation in Garrison pool, Okfuskee County, Oklahoma.

To incorporate all of these features in such a plant involved a compromise between complete gasoline recovery and low investment and operation costs. For a plant recovering only a small daily volume of gasoline, the direct operating labor charge is very high if a shift operator is needed to run the plant. A reasonable gasoline recovery can be economically justified where the plant can be run without the service of a shift operator. This plant was designed to meet these latter conditions.

On a basis of design the plant recovers 90 per cent of the gasoline content in the gas as determined by means of a low-temperature fractional analysis. This recovery permits the process to employ a cold oil circuit which requires no source of external heat such as boilers or direct-fired heaters. These heat-generating units usually require quite close attention. Consequently where they are employed shift operators are usually required.

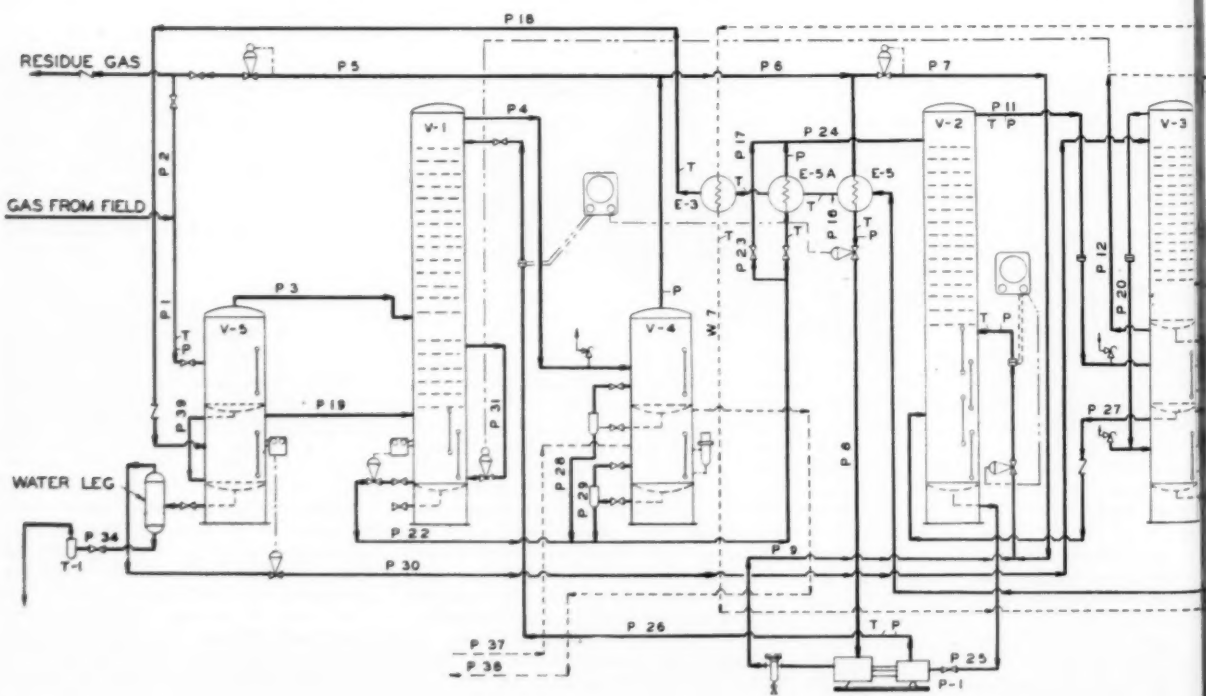
Development work on this plant design was commenced before World War II and was suspended by the war. After the war, the design was completed and several plants using the process flow were installed. The first plant of this type was installed by Otha H. Grimes at Arcadia, Okla. *(see The Oil and Gas Journal, April 8, 1948, page 77)*. The plant has a capacity of 2,000,000 cu. ft. per day and has been in operation since September 1947. The second plant was installed at Trent, Tex., and has a capacity of 1,500,000 cu. ft. per day. The third plant installed is at Apache, Okla., and has a capacity of 3,500,000 cu. ft. per day. None of these plants has the feature of true portability and all employed steam to heat the reboilers of the L.P.G. and gasoline fractionators. Development work based on experience with these three plants resulted in the Garrison pool plant which is truly portable *(see The Oil and Gas Journal, September 7, 1950, page 78)*.

Located on an old lease approximately 3 miles south of Okemah, Okla., this packaged-type plant has taken over operations of an earlier larger plant, since its operation was unprofitable because of declined production. The earlier plant was removed several years ago and only a compressor station was left at the site to boost the gas from field pressure of 10 to 15 psig. to the 160 psig. necessary to make delivery into the line of a public-utility company.

Small Gas Production

Gas production from the lease is small, 600,000 to 700,000 cu. ft. per day, and is produced from three wells. Two of these wells produce no oil and the third only a small quantity. The new and portable plant was installed between the old booster station and the line of the public-utility company. It has been in operation since the end of June 1950.

To facilitate description of the flow of the process used by this plant, reference is made to the accompanying diagram. Field gas or cooled high-stage field compressor discharge gas enters the top compartment of V-5 through line P-1. Any condensate in the gas separates in this top com-



Completely Portable

by L. S. Gregory*

partment and passes into the lower compartment of V-5. The gas leaves the top of V-5 through line P-3 and enters the absorber V-1 where it is stripped of its gasoline components by countercurrent contact with lean oil.

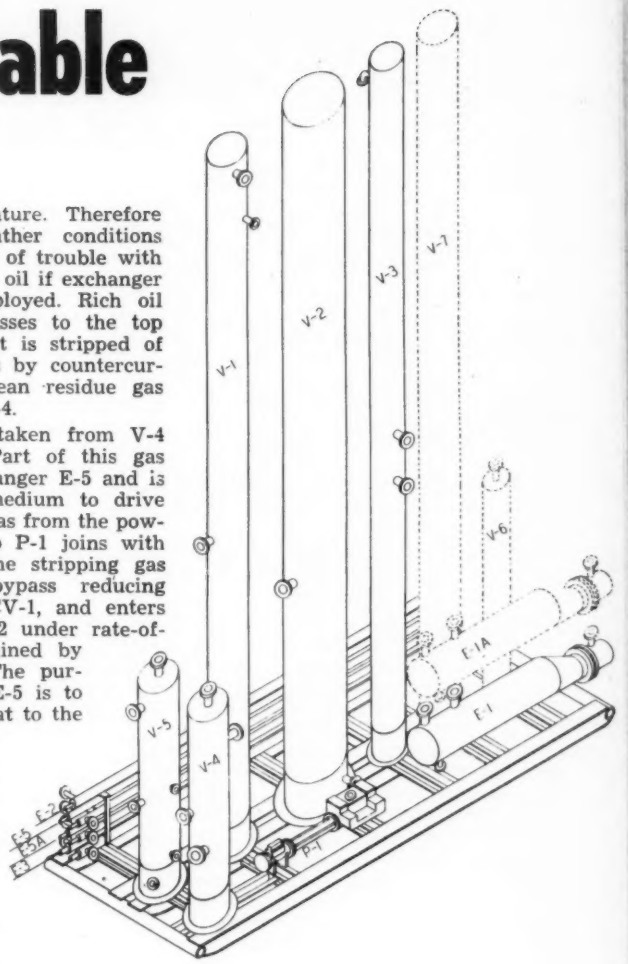
Stripped gas leaves the top of V-1 through line P-4 and enters the top compartment of V-4 which serves as a residue-gas scrubber. Any oil collected in this compartment is trapped out and returned to the rich-oil stream. Residue gas leaves the top of V-4 and passes through back-pressure control SPCV-2. Rich oil from the top section of absorber V-1 is either introduced into the reabsorber section immediately below or bypasses this reabsorber section as dictated by control valve BPCV-1. This control valve is actuated by the suction pressure on the recompressor and this arrangement prevents overloading of the recompressor by excessive recycling.

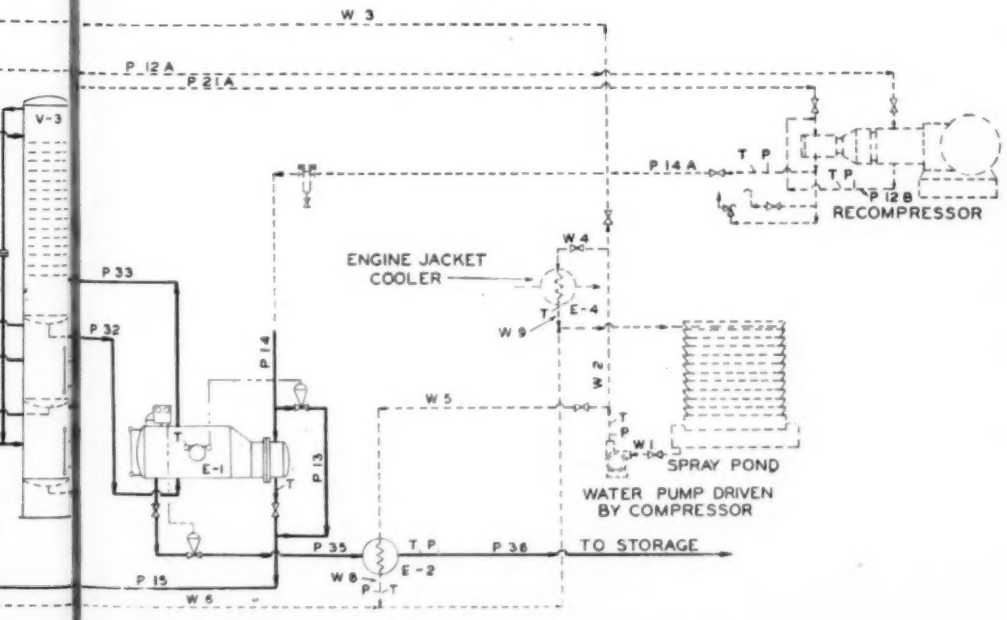
Rich oil from the base of absorber V-1 under liquid-level control passes to exchanger E-6A. This exchanger is required when the unit is operated in extremely cold weather. Due to the adiabatic nature of the oil cycle the oil temperature tends to approach atmospheric temperature. Therefore under extreme weather conditions there is a possibility of trouble with the pour point of the oil if exchanger E-6A were not employed. Rich oil leaves E-5A and passes to the top of still V-2 where it is stripped of its gasoline fractions by countercurrent contact with lean residue gas from accumulator V-4.

Stripping gas is taken from V-4 through line P-6. Part of this gas passes through exchanger E-5 and is used as a power medium to drive pump P-1. Exhaust gas from the power cylinder of pump P-1 joins with the remainder of the stripping gas brought through bypass reducing pressure valve, PRCV-1, and enters the base of still V-2 under rate-of-flow control maintained by control RFRCV-2. The purpose of exchanger E-5 is to furnish sufficient heat to the power gas driving pump P-1 so that the temperature in the power cylinder will not be low enough to cause lubrication difficulties.

Theoretically, sufficient stripping gas could be em-

*Portable Gasoline Plants, Inc., Tulsa. Summary of paper presented at Natural Gasoline Association of America meeting, Tyler, Tex., October 1950.





***Above:** Schematic arrangement of major equipment in the portable plant. The items identified are: V-1 Absorber, V-2 still, V-3 Stripper-stripper scrubber-recompressor intake scrubber, V-4 low stage and residue scrubber, V-5 high stage and recompressor accumulator, V-6 fractionator scrubber and accumulator, V-7 fractionator, E-1 stripper reboiler, E-1A fractionator reboiler, E-2 gasoline cooler, E-3 recompressor aftercooler, E-5 power gas exchanger, E-5A oil exchanger, P-1 pump.*

***Left:** Flow layout of the gasoline-recovery plant.*

ployed to reduce the lean-oil vapor pressure to a very low point and thereby permit a very high recovery of gasoline fractions. However, an increase in stripping gas increases the recompressor load. It has been determined that it is most economical to strip the oil only sufficiently to permit a recovery of 90 per cent of the gasoline content of the incoming gas as determined by low-temperature fractional analysis. If for any reason the operator desires to recover less than 90 per cent of the gasoline in the gas the plant initial cost is reduced rapidly.

Stripped lean oil is taken from the base of the still V-2 through line P-25 to the suction of the oil pump P-1. The pump discharges through line P-26 to the top of the absorber V-1. The speed of the pump is controlled by rate-of-flow control instrument actuating control valve RFRCV-1 in the power gas line P-8. Still V-2 is maintained under vacuum by withdrawal of the stripped vapors through line P-11.

Vapors pass into top scrubber compartment of V-3 via line P-11. This compartment is equipped with a Mercoid shutdown to protect the recompressor in event that liquid accumulates in this compartment. The vapors leave this compartment and pass through line P-12, to the suction of the recompressor. This recompressor is a two-stage unit with no intercooling between stages. The intercooling is now employed between stages in order that the high discharge temperature of the recompressor will be adequate to transfer heat as required in the plant. This temperature is not destructive to the valve mechanism of the recompressor as it is approximately 300° F.

Hot discharge gas from the recompressor passes through line separator LS-2 to remove any traces of lubricating oil and enters the tubes of reboiler E-1 where it acts as a heating medium for the reboiler. The temperature control of the reboiler is insured by control valve TCV-1 in bypass P-13. The gas leaves the reboiler through line P-15 and enters exchangers E-5 and E-5A where a portion of the heat is transferred. The gas then enters water condenser E-3 where a portion of the gas is condensed. The condensate and gas enter the bottom compartment of V-3 through line P-18 where they are separated.

Noncondensed gas is returned through line P-19 to the reabsorber section in absorber V-1. The condensate in the bottom compartment of V-5 is withdrawn from the base of V-5 and enters the water leg. This leg is buried in the ground and its function is to collect any water that may be in the condensate to prevent freezeups on the downstream side. The water is trapped from the leg and it discharged from the system. Condensate from the leg under liquid-level control passes through line P-30 to the top of stripper V-3.

Function of stripper V-3 is to properly stabilize the produce. The reboiler E-1 is operated at approximately 150° to 180°, depending on vapor pressure desired. Vapors leave the top of V-3 through line P-20 and enter bottom compartment of V-3. This compartment is equipped with Mercoid shutdown to protect the recompressor. Vapors leave the bottom compartment of V-3 through line P-21 and are returned to the intake of the high stage of the recompressor.

Reboiler product from E-1 is trapped through line P-35 to water cooler E-2 and sent to storage. The water pump is driven by the recompressor and takes suction from the spray pond, discharges through various coolers mentioned above, and is returned through spray nozzles to the spray pond for cooling. The amount of water required is small as obviously the cooling requirements are not great.

Plant Yields

The Arcadia, Trent, and Apache plants were designed to produce natural gasoline and L.P.G. However, the L.P.G. market in the spring of 1950 was so unhappy that the Okemah plant was set up to produce natural gasoline only.

The plants producing L.P.G. vary the vapor pressure of the L.P.G. from 90 to 125 lb. and of the gasoline from 18 to 26 lb. depending on seasonal demand. A material balance on the Arcadia plant when it was producing 125-lb. L.P.G. and 22-lb. gasoline shows the following recoveries:

	Per cent
Propane	35
Iso and n-butane	89
Pentanes and heavier	90.7

The ethane content of the L.P.G. was under 2 per cent and the propane content of the natural under 0.5 per cent.

This portable-type plant is suitable for high L.P.G. recovery. Though the lean oil is not well stripped in reference to pentane and heavier components of the gas, it is satisfactorily stripped in regard to propane and butane. To obtain a high L.P.G. recovery it is necessary to increase the oil rate and recompressor capacity. The increase in oil rate involves only an increase in pump size at nominal cost since no oil, oil heat exchangers, oil coolers or heaters are involved in the oil circuit.

The increase in recompressor capacity is a reduced function of the increase in propane recovery to the required increase in recompressor capacity is not burdensome. Another fractionator is required if a separate stream of L.P.G. is desired. This fractionator is not shown on the flow sheet but its position is indicated on the skid as V-7, in the accompanying drawing. In the last several months a third fractionator has been added to the Apache plant and this plant now produces commercial propane, L.P.G., and gasoline.

The Okemah plant as mentioned above produces only 26-lb. gasoline. The gasoline is very stable and is a finished marketable product. The propane content has varied from 0.2 to 0.6 per cent progane and the butanes content from 31.0 to 35.0 per cent. Table 1 gives the yields from the four plants on a monthly basis.

Okemah Plant Economics

The skid unit and recompressor comprising the Okemah portable gasoline plant have a replacement value of approximately $30,000. Operating labor cost is very low, averaging 1

(Continued on page 72)

TABLE 1—YIELD DATA

Month—	Gallons per M.c.f. — Total liquid	L.P.G.	Natural	Vapor pressure natural (psi.)
Arcadia plant:				
October 1949	5.34	3.54	1.80	18
November 1949	5.60	3.78	1.82	18
December 1949	5.60	3.85	1.84	18
Trent plant:				
October 1949	6.26	3.95	2.31	18
November 1949	6.17	4.12	2.05	18
December 1949	6.21	4.52	1.69	18
Apache plant:				
October 1949	2.76	1.77	.99	20
November 1949	3.00	1.99	1.01	20
December 1949	3.48	2.50	.98	20
Okemah plant:				
July 1950		None	1.35	26
August 1950		None	1.49	26
September 1950		None	1.58	28

TABLE 2—OKEMAH PORTABLE PLANT PRODUCTION AND SALES DATA, JULY THROUGH SEPTEMBER 1950

	July	August	September	Total 3 months
Incoming volume:				
M.c.f. gas statements (4-oz. basis)	19,617	19,886	20,050	59,553
Production:				
26-lb. gasoline (gal.)	26,473	29,672	31,633	87,778
Sales:				
Gasoline (gal.)	22,735	31,916	28,085	82,736
Revenue (gasoline)	$1,440.13	$2,022.67	$1,889.89	$5,352.69
Residue gas (M.c.f.) (403 basis)	19,070	19,800	19,870	58,740
Revenue (residue gas)	$855.00	$887.85	$890.65	$2,633.50

Note: Plant fuel not included in above gas volumes.

Get higher treating efficiency, greater economy of operation, and longer life from your plant equipment by improved

GAS-TREATING PROCESS

by A. L. Kohl*

PROBLEMS involving gas purification have grown in importance during the past few years due to the tremendous expansion of the natural-gas industry, the increased dependence upon sour oil and gas fields, and the trend among oil refineries toward eliminating the combustion of sour fuel gases. Principal contaminants encountered in natural and refinery gases are hydrogen sulfide, carbon dioxide, and water vapor, although others such as mercaptans, carbon disulfide, carbon oxysulfide, oxygen, and nitrogen are also occasionally present.

Treating processes in common use for hydrogen sulfide removal fall into two classes—those in which the absorbent is regenerated by oxidation of the sulfur compound to free sulfur and those in which the hydrogen sulfide is stripped from the absorbent unchanged by the application of heat or stripping vapor. Typical examples of the air-reactivation type are the iron oxide dry-box process, the iron soda process, and the Thylox process, while examples of the heat reactivated type are the phenolate, tripotassium phosphate, and amine processes. The Seaboard process is also of this type, although air is used as a stripping vapor.

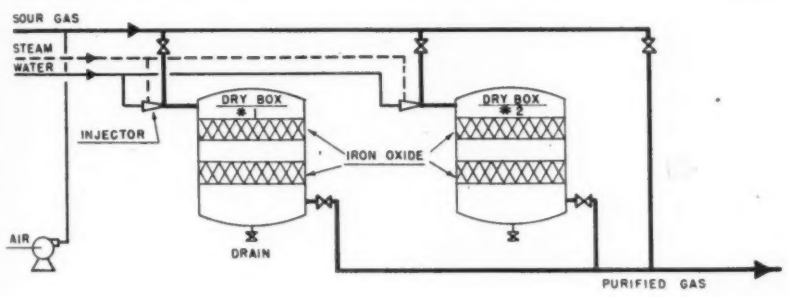
*Fluor Corp., Ltd. Presented at California Natural Gasoline Association, fall meeting, Los Angeles, November 1950.

A simplified diagram of the iron oxide dry-box process which has been in use for a great many years is shown in Fig. 1. Frequently, four oxide boxes are used with the valves arranged so that the gas can be made to contact the freshest box last. According to reaction (1), each pound of iron oxide can absorb about 0.6 lb. of H_2S. In practice, only about one-half of this theoretical yield is obtained unless air is added to the inlet gas stream.

The addition of air causes reactions (2) and (3) to proceed, with the formation of elemental sulfur and the partial regeneration of the iron oxide, so that the bed may be kept in use until the quantity of deposited sulfur is great enough to interfere with the contact efficiency or cause an excessive pressure drop. Regeneration may also be accomplished by removing the spent oxide and exposing it to the air. This may be done about 10 times before a bed requires replacement. The iron oxide operates best at a temperature between 80° and 100° F. in the presence of excess water and at a pH of about 11.

The process has the disadvantages of noncontinuous operation, cumbersome equipment, and high operating cost when used to remove appreciable quantities of H_2S; also the disposal of spent iron oxide may present a problem. However, it is able to remove the hydrogen sulfide to extremely low levels (below 0.25 grains per 100 standard cubic feet) even at low pressures, and may be economically justified where the quantity of hydrogen sulfide to be removed is very small and where the presence of other contaminants in the gas such as air, CO_2, HCN, COS, and CS_2 may affect the economics of other processes which would produce equally sweet gas.

Essentially the same chemical reactions are utilized in a continuous

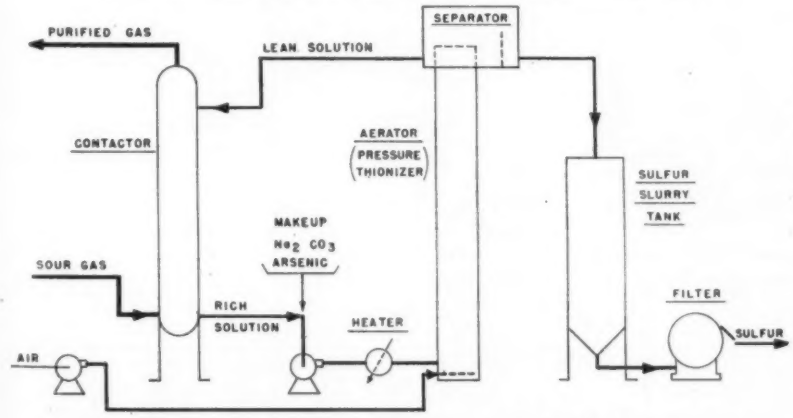


$$2\,Fe_2O_3 + 6\,H_2S = 2\,Fe_2S_3 + 6\,H_2O \quad (1)$$

$$2\,Fe_2S_3 + 3O_2 = 2\,Fe_2O_3 + 6S \quad (2)$$

$$6\,H_2S + 3O_2 = 6\,H_2O + 6S \quad (3)$$

Fig. 1—Flow arrangement of iron oxide, dry box, purification process.



$$Na_4As_2S_5O_2 + H_2S = Na_4As_2S_6O + H_2O \quad (1)$$

$$Na_4As_2S_6O + \tfrac{1}{2}O_2 = Na_4As_2S_5O_2 + S \quad (2)$$

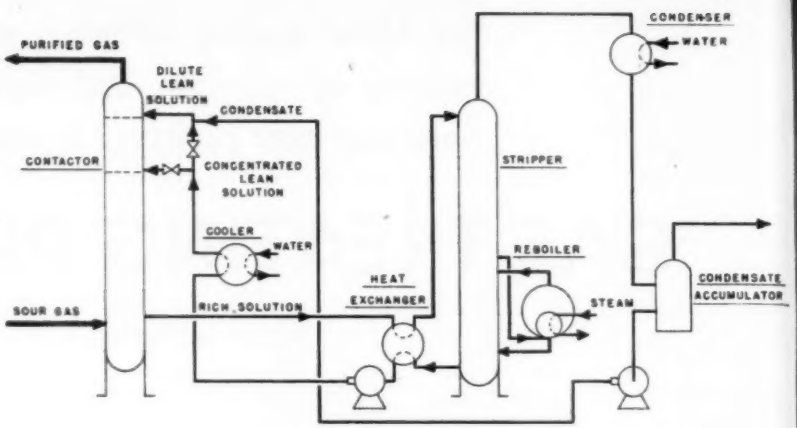
Fig. 2—Schematic layout of Thylox gas-purification process flow.

system in the iron soda process; however, the hydrogen sulfide removal efficiency of this system is not as high as that of the dry-box method. The iron soda process has recently been applied to gas from Santa Maria oil field and is reported to reduce the H_2S content from about 34 to 3-4 grains per 100 standard cubic feet. In this plant CO_2 is removed from the gas by a monoethanolamine plant in a subsequent step and utilized for the manufacture of dry ice. The iron soda slurry is regenerated by aeration in a series of long troughs and elemental sulfur which separates as a froth is skimmed from the surface.

A similar cycle is employed by the Thylox process illustrated in Fig. 2. Although no instances of the application of this process to natural or refinery gases are known, it is used in a number of plants for the purification of coke oven gas and is of interest because of its ability to produce a marketable product directly. In typical plants the H_2S content of the gas is reduced from about 300 grains per 100 standard cubic feet in the feed to 6-15 grains in the product gas which is then further cleaned in dry boxes.

The Thylox process is selective for H_2S in the presence of CO_2; which is occasionally an advantage and sale of the sulfur product approximately balances the cost of operation in some instances; however, it has the disadvantages of process complexity, high power consumption, and incomplete hydrogen sulfide removal.

A number of processes have been developed which utilize solutions of the weak acid salts of strong alkalis as absorbents for H_2S. The Koppers



$$K_3PO_4 + H_2S = KHS + K_2HPO_4 \quad (1)$$

$$K_3PO_4 + CO_2 + H_2O = KHCO_3 + K_2HPO_4 \quad (2)$$

Fig. 3—Flow diagram, tripotassium phosphate gas-purification process.

phenolate, Shell tripotassium phosphate, and Seaboard sodium carbonate processes are examples of this type of operation which have been applied commercially to a considerable extent. A simplified flow diagram of a tripotassium phosphate gas-treating plant is shown in Fig. 3.

All of these processes are partially selective for H_2S in the presence of CO_2 due to the more rapid reaction of H_2S with the solution. However, CO_2 which is absorbed is regenerated with difficulty so that a high percentage of CO_2 in feed gas may increase steam and pumping requirements considerably. The Seaboard process which uses a 3 per cent sodium carbonate solution has been applied to a considerable extent for the treatment of natural-gas streams, but is generally being replaced by amine processes, which are capable of effecting much more complete hydrogen sulfide removal.

It is probable that the phenolate and phosphate processes are not competitive with the amine systems for ordinary gas-treating operations because of their comparatively low acid-gas-removal efficiency, and high steam consumption. The phosphate process has the advantage, however, of utilizing a stable nonvolatile reagent and is therefore applicable to

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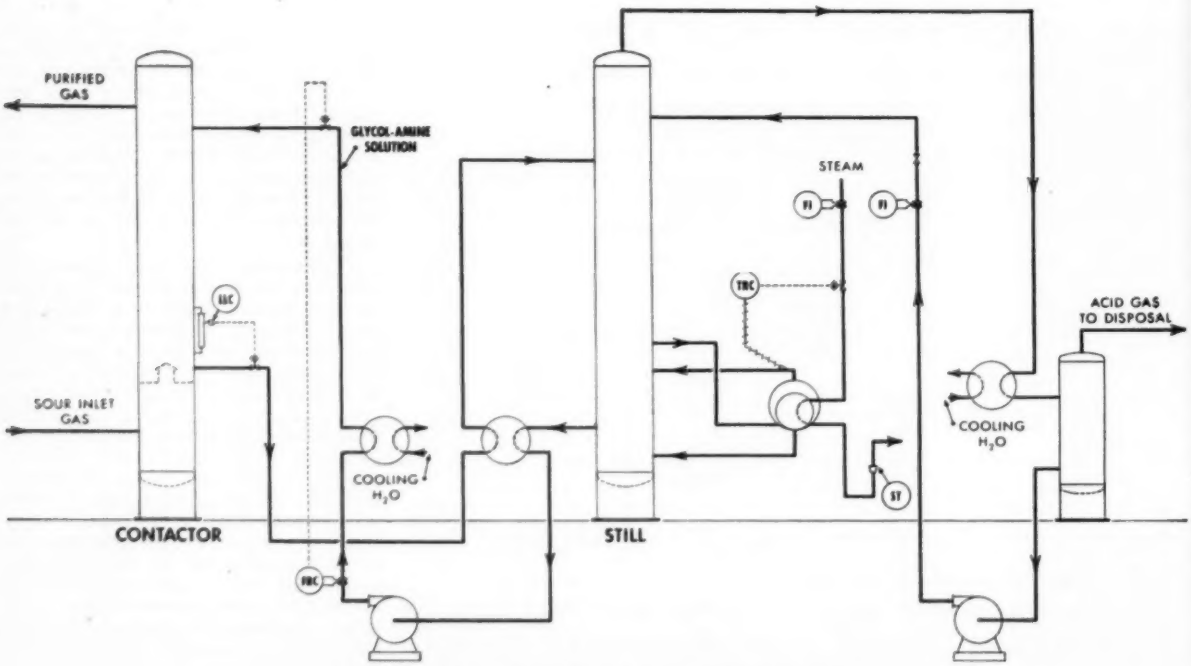
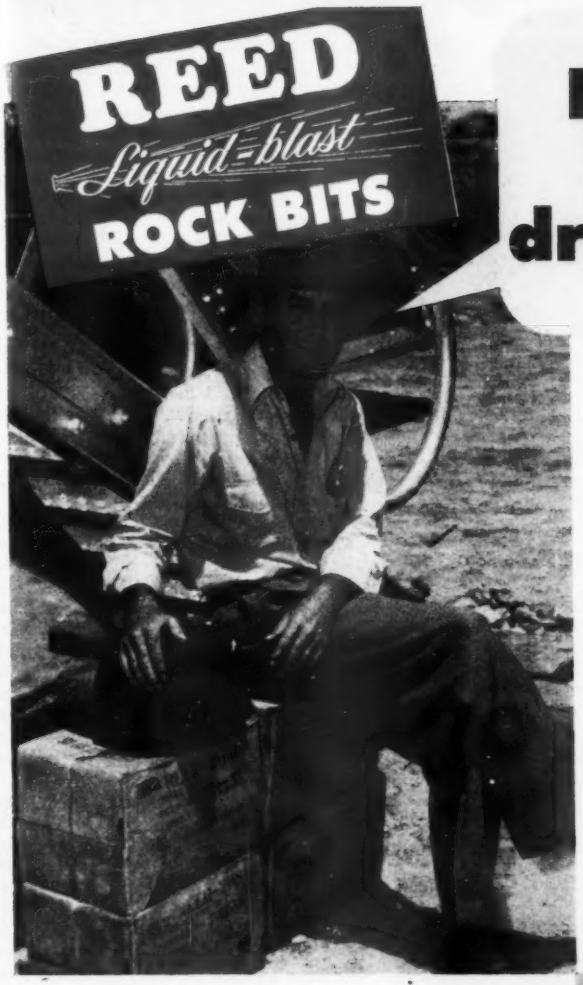


Fig. 4—Typical flow layout, glycol-amine gas-treating process.



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...says Wendell Powell, tool pusher for Lawson Drilling Company

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● Reed "LB" Rock Bits give good long runs because jets of drilling fluid clean the bottom of the hole. Cutters are always drilling new formations, giving faster drilling and more hole per bit.

The Reed 2HS-1 Rock Bit shown here gets good footage in hard lime and chert.

J. A. Jackson, driller for Lawson Drilling Company, is shown with a Reed Reamer.

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This powerful diesel-electric drilling rig of Humble Oil & Refining Co. has a main power plant producing 3,240 hp. It is shown here drilling in Lake Washington field of South Louisiana. A diesel fuel barge, a production test barge, and two quarter boats can be seen in addition to the power and drilling barges which constitute the rig.

Humble Making Hole With

World's Most Powerful Barge-Mounted Rig

by Leigh S. McCaslin, Jr.
Houston District Editor

Power now available on rebuilt Rig 20 is sufficient for any conceivable drilling job. Major new items of equipment are mud mixer, fresh-water system, two main mud pumps, and electrical control equipment

HUMBLE OIL & REFINING CO. is now making hole in South Louisiana with a barge-mounted diesel-electric drilling rig which can deliver 2,680 hp. to the draw works. This is believed to make this rig—Humble's Rig 20—the most powerful in the world from the standpoint of available horsepower.

There have been two other unusually powerful drilling barges put into service in South Louisiana during the past year. Penrod Drilling Co. has a new diesel-electric rig which generates a total of 1,800 kw. (2,414 hp.) with 1,500 kw. (2,012 hp.) available for drilling and 300 kw. (402 hp.) for auxiliary purposes.[1] The Texas Co. put into service some months ago a diesel drilling barge with a main power plant of four diesel engines developing a total of 1,940 hp.[2]

Humble's Rig 20 is not a 100 per cent new rig—the power barge is new, but the drilling barge has seen previous service. The drilling barge on the old Rig 20 had all the electric equipment (and most of the drilling equipment) necessary for an extra-heavy rig. Hence, it was decided to build a larger power barge for the rig and discard the old power-generating equipment. This has lifted Rig 20 from the 10,000-ft. to the 20,000-ft. class.

By an interesting coincidence, the renovated and high-powered Rig 20 is at work in the same field where Humble's first diesel-electric rig drilled back in 1930. The discovery well of this field — Lake Washington in Plaquemines Parish—was brought in by that early diesel-electric unit. In contrast to Rig 20 with its 2,100 kw., the initial Humble diesel-electric rig had only 250 kw. of generating capacity.

New Equipment Items

The power now available on Rig 20 is sufficient for any conceivable drilling job. However, the drilling and hoisting equipment now on the rig is not the largest and heaviest made. This equipment is essentially the same as was being used before the new power barge was constructed. The main motors, draw works, and rotary are still the same. Only major new equipment items are a mud mixer, fresh-water system, two main mud pumps, and electrical control equipment.

The new power barge for Rig 20 was built at Orange, Tex., where the major equipment was mounted. It was then towed to the Humble dock in the Houston Ship Channel where company personnel installed the wiring. All design work for the barge was handled by Humble's Petroleum Engineering Division.

All major machinery on the power barge was purchased as war surplus with the resultant economies in initial cost. The barge itself is a steel, wood-sheathed craft 100 ft. long by 29½ ft wide by 12 ft. deep. The main gen-

erators, diesel engines, and auxiliary generator are installed on the machinery deck of the power barge.

For the main power supply, three 12-cylinder, 1,080-hp., two-cycle reconditioned war-surplus diesel engines direct connected to reconditioned and slightly modified generators (originally rated at 1,200 kw.) are used. The engines have closed fresh-water cooling systems. The lube oil is also cooled with heat exchangers. They are electrically started from a 32-volt auxiliary diesel-electric starting set.

Main Generators

The main generators are rated at 1,200 kw., 525 volts at 750 r.p.m., and are separately excited. In their original use in destroyer-escort vessels, the generators were rated at 1,200 kw. However, for the Humble installation, with the engines furnishing 1,080 hp., the output of each generator is limited to about 700 kw. (This is the net for use at main motors after losses in generator, cable, and 60-kw. auxiliary power are deducted.) In addition to a main generator, each engine also drives a 60-kw., 125-volt d.c. generator, which furnishes power for auxiliary pumps, lighting, and other auxiliary rig equipment.

The generators are considerably larger than necessary for the engines involved. However, it does not take appreciably more power to drive the oversized units at 700 kw., than it would to drive a generator with a 700-kw. rating. An advantage to the large generators are the very high currents possible. The current limit of the units is set at 2,500 amp., which means that the draw-works motor can be operated momentarily at 250 plus per cent of rated torque. This extra torque can be used to good advantage when pulling pipe.

The three main generators may be used separately on any of the motors powering the draw works, mud pumps, core reel, and rotary or they may be paralleled on the draw-works motor for hoisting. With the generators in parallel, they can deliver 2,680 hp. at the draw-works motor shaft. (And, at the same time, have 180 kw. available for motor excitation and auxiliary equipment.)

Normally, only one unit is driven from any one generator. This is because generator output controls the actual operation of any particular unit. However, both pumps can be run off one generator since dual operation is normally accomplished with the pumps operating at the same speed.

Knife switches located on the drilling barge control the assignment of various equipment to the generators. Once the assignment has been made, the driller has complete control of the rig's operation from his position. The driller has the master speed controllers for the draw works, rotary, and pumps at his position. He can assign any of the three generators to either hoisting or drilling service. Other devices at the driller's position include: an emergency stop which disconnects all power units simultaneously; a voltmeter to indicate rotary speed; and two ammeters which indicate rotary and draw-works torque.

Several safety features are provided in the electrical circuit. Relays prevent closing the hoist or drill contacts if voltage exists on the generators. This prevents closing a live generator on a dead bus. Another relay on the draw-works circuit prevents closing the hoist contact if voltage exists on the draw-works bus. This eliminates the possibility of connecting a dead generator to a live draw-works bus.

The speed of the draw works, coring reel, rotary, slush pumps, and mud-mixing pump is controlled by varying the applied voltage to the armature of the motor involved. The generator voltage is increased by first increasing the generator field excitation to full field current and then increasing the engine speed. Both operations are controlled by the master speed controllers. As a master speed controller is rotated counterclockwise for the first half of its travel, the generator field is increased. The second half of the controller travel speeds up the engine.

Individual Generator Control

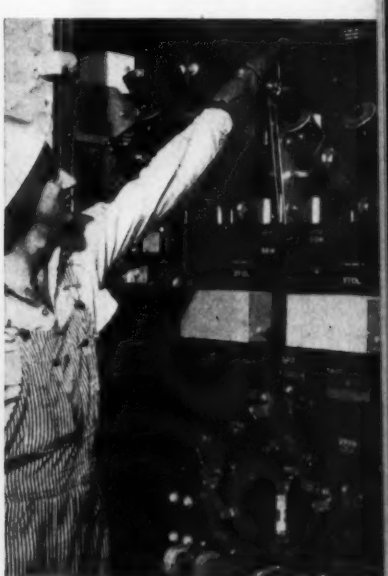
The control of the generator field excitation is accomplished through the use of an individual amplidyne control for each generator. This motor-generator set consists of a 10-hp. motor directly coupled to the amplidyne and an a.c. generator.

The purpose of the amplidyne control system is to vary, within the desired range, the relatively high field current of the main generators by varying a proportionally small current in the amplidyne circuit with the small rheostat in the master speed controller. Without the amplidyne control of the generator field current, unusually large rheostats would be required.

Another feature of the electric control system on Rig 20 is the use of

(Continued on page 86)

In this night picture can be seen the well-designed interior layout of Humble's new power barge. Three 1,080-hp. diesel engines are directly coupled to three generators rated at 1,200 kw. for the main power supply. In addition to a main generator, each engine also drives a 60-kw., 120-volt d.c. generator which furnishes auxiliary power.



This control panel, located on the drilling barge, enables the driller to assign various drilling equipment to the three main generators.

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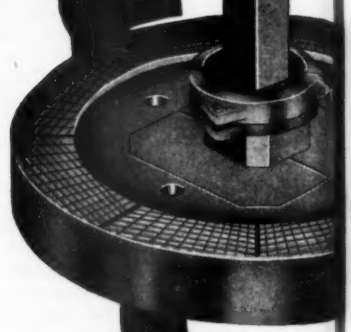

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Our Oil and Gas Reserves—

Their Meaning and Limitations

by Frederic H. Lahee*

In discussing the subject of reserves of crude oil, natural-gas liquids, and natural gas, care should be taken to understand and to explain the scope of the term "reserves." Too often different persons use the same word with very different meanings.

The habit of dividing the year-end reserves by the production of that year to obtain an idea of the number of years of remaining supply is fallacious and leads to erroneous conclusions.

The figures published by the American Petroleum Institute for proved reserves under "new discoveries" include the proved reserves of newly discovered fields and also the proved reserves of pools which belong in fields discovered prior to the year reported. This fact leads to underestimating the quantity of new reserves which will be subsequently proved by drilling and added to the proved reserves of the newly discovered fields in any given year.

Two essential points to remember are:

1. There are still many billions of barrels of as yet unproved oil reserves and many trillions of cubic feet of as yet unproved gas reserves, on this North American continent.

2. The estimates of proved reserves of these hydrocarbons are always only a part of the supply.

A VERY important subject is that which relates to our nation's reserves of crude oil, natural gas, and natural-gas liquids.

It is a subject of primary concern to the public, to the Government, and to industry. It is a subject which has been widely discussed, widely misstated, and widely misunderstood. In this paper I shall try to clarify some of the points which have led to erroneous conclusions.

A first essential in the successful interchange of ideas is exact definition of the terms used. If two people employ a certain word with two very different meanings and without explaining, each to the other, what these meanings are, little of value will come from their arguments. When estimates of reserves of oil or of gas are published, or when references are made, verbally or in print, to these reserves, and no mention is made of the intended scope of this term "reserves," all sorts of confusion may result. Whenever we use this word, as applied to quantities of hydrocarbons, we should precede it with an adjective which will define its coverage. Let me explain more fully, and for convenience let me refer to crude oil only, although the facts apply equally well to natural hydrocarbon gas.

In estimates of reserves, only **recoverable** reserves should be understood. We know that not all the oil in a reservoir can be brought to the surface, even by the best means of extraction, so that there is always a certain percentage left behind in the ground. The percentage which **can** be produced is called the **recovery factor.** For instance, if 60 per cent of the total amount of oil in the reservoir can be withdrawn, leaving 40 per cent behind because this 40 per cent cannot be extracted from the rock by the recovery methods in use, then 60 per cent is the recovery factor.

The total quantity of oil estimated originally to have been present in the pore spaces of the reservoir multiplied by the recovery factor is the estimated **total ultimate yield.** At any given date in the producing life of a reservoir, the total ultimate yield will be the total cumulative production up to that date plus the total recoverable reserves estimated as of that date.

The recovery factor varies not only according to geological conditions of the reservoir, but also according to the methods of extraction employed. Application of successful secondary-recovery methods increases the recovery factor. Therefore, it follows that if a secondary-recovery method, such as water injection or gas injection, is installed in a field some years after this field has been producing by the so-called primary methods (natural flow and pumping), the estimated recoverable reserves of the field as of that date will thereby be increased due to this increase in the recovery factor.

Drilled Versus Undrilled Reserves

In most of our modern oil fields the wells are located and drilled according to a definite spacing pattern such that each well may be regarded as drawing its oil from a part of the reservoir lying directly beneath a specified unit of area on the surface. Thus, each well might be centrally located in a 40-acre tract, all the field being patterned in a grid of contiguous 40-acre tracts. Or the units might be 20 acres each or 10 acres each, or of some other size. (We need not concern ourselves here with irregular spacing patterns, nor with holes off the vertical, nor with the fact that some of the wells may produce part of the oil from adjoining units.) Our estimates of the reserves of an entire reservoir, or of the several reservoirs in an entire field, will be based on the assumption that only oil originally directly beneath each individual unit will be produced by the well drilled on that unit.

Let us now consider a hypothetical case of a broad geological basin province **known** to be underlaid by sedimentary rocks which are **known** to include, at least in part of the province and possibly in all of it, strata which are favorable to the origin and accumulation of petroleum. For the sake of description, let us assume that the northern half of this province has not been carefully explored; whereas, the southern half has been mapped in detail, both by geology and by geophysics.

In this southern part of the province several structures of types favorable to oil accumulation have been found. Some of these have not yet been drilled. Some of them have been drilled either by a few holes or by a considerable number of holes, but in any case not yet with the full number of holes which may eventually be drilled on the adopted spacing pattern. And one of these structures has been completely "drilled up," as we say.

With information made available through the drilling and through production history, it is possible fairly accurately to estimate the recoverable reserves of oil remaining under the drilled units. This oil is called **drilled proved reserves.** Adjacent to, or sometimes between, drilled units there may be units not yet drilled, but so closely related to the drilled units that we can apply the data secured in the nearby wells in estimating the oil reserves under these undrilled units. These reserves are classed as **undrilled proved reserves.**

"Possible" Reserves

On any of the structures mapped in our hypothetical basis, where the prospects for oil look good, but where there is still a lot of undrilled territory, we may make a scientific guess at the area which may yield oil when and if drilled, and we can make assumptions as to thickness, porosity,

*Geological and research counselor, Sun Oil Co., Dallas. Paper presented at A.P.I. Division of Production, Dallas.

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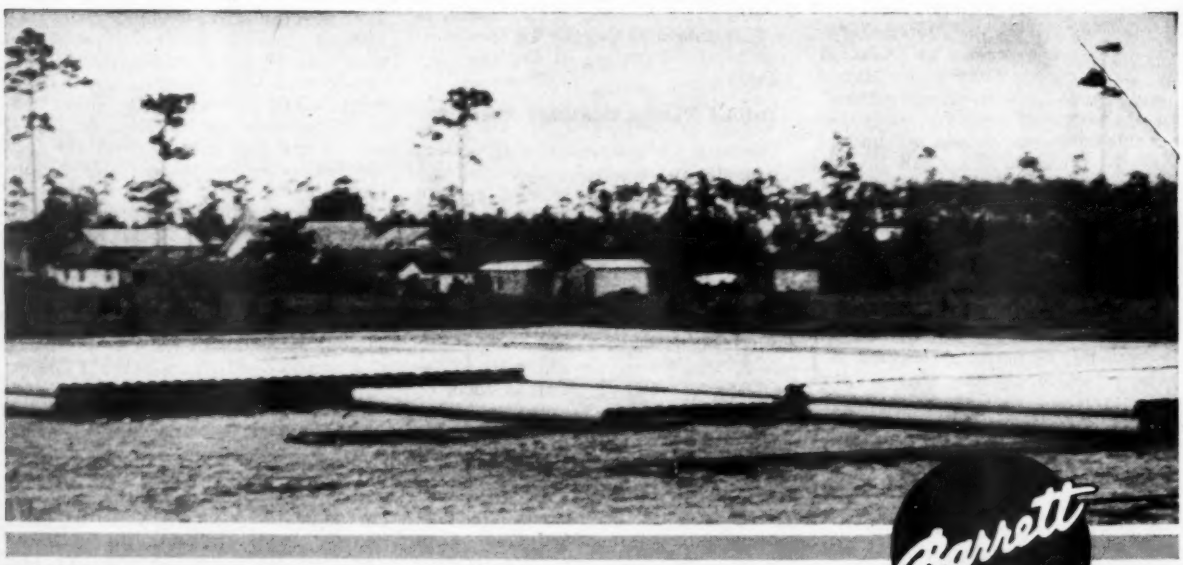

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and permeability based on these factors as already measured in the "pay" which produces in the drilled part of the structure; and from this study we can roughly guess at "possible reserves," i.e., reserves which may be thought of as **discovered**, but not yet **proved.**

Likewise, within the proved portions of drilled fields we may consider that the additional oil which may be obtained by eventually installing secondary-recovery methods constitutes a second body of **discovered possible** reserves. Such "additional oil" is not regarded as proved until after operation of secondary-recovery methods has begun, or until after operation of a pilot plant has demonstrated what may be expected.

There are other classes of **possible** reserves which have not yet been discovered. Such would be the recoverable oil that might be obtained (1) from undiscovered pools **above** producing pools; (2) from undiscovered pools **below** producing pools; (3) from undiscovered pools on producing structures, but outside the limits of the producing pools already found on these structures; and (4) from pools that may be present on structures, still undrilled, but similar in all known respects to the producing structures in the same general region—here, returning to our hypothetical case, the mapped undrilled structures in the southern half of our geological-basin region.

In the northern half of this basin we may assume that there are local structures similar to those in the southern half, and that these structures may hold oil reserves, under conditions similar to those prevailing in the southern explored part of the basin. We may go even further than this, and guess that there may be oil under proper conditions in other undrilled regional basins more or less similar to our hypothetical case. All such reserves would be purely **hypothetical.**

In summary, then, there are several classes of oil reserves—drilled proved, undrilled proved, discovered possible, undiscovered possible, and hypothetical; and within the classification of possible and hypothetical reserves, there are several subclasses. This brings us back to our first thesis, that in referring to oil reserves (or gas reserves), it is absolutely essential, for clear understanding, to define the scope of the term.

At this point, I want to stress the fact that in all reports of the American Petroleum Institute's committee on reserves, special care is taken to state that only **proved** reserves are included in the estimate, and, further, a list is given of those classes of reserves which are **not** included in the figures. It is the duty of those who use these reports to read the text and to make themselves thoroughly familiar with the actual scope of the estimates.

Future Supply of Oil

There has been a tendency—in fact, it has almost developed into a habit—among many of those people who bemoan the diminishing ultimate supply of oil reserves, to divide the estimated reserves as of the end of a given year by the quantity of oil produced in that year, and to state that the quotient represents the number of years left during which we may expect to be able to benefit by our domestic supply. That this line of reasoning is fallacious may be seen if we apply it through a series of years. Thus, the quotient of the estimated proved reserves at the end of the year divided by the production of that year was as follows for each of the years listed:

Year	Quotient
1937	12.2
1938	14.3
1939	14.6
1940	14.1
1941	13.9
1942	14.4
1943	13.3
1944	12.2
1945	11.9
1946	12.1
1947	12.3
1948	12.2

In 1921, using the estimate of proved reserves (5 billion barrels) of the American Association of Petroleum Geologists and the U. S. Geological Survey, this quotient was 10.6. In 1933, using H. B. Soyster's estimate of 13,360,000,000 bbl. of proved reserves, the quotient was 14.75. Nevertheless, during this period of 28 years, the estimated proved reserves of the United States rose from the 5 billion barrels of the 1921 report to over 23 billion barrels of crude oil (plus 3.5 billion barrels of natural gas liquids) in the A.P.I. report for 1948, and this in spite of a total production, during this period of over 17 billion barrels of crude oil.

Of course these figures vividly emphasize the absurdity of using this quotient as an index of the remaining life of our total reserves or even of our **proved** reserves. A statement such as "American oil reserves will run out in 15 years" stamps the author of it as profoundly ignorant of this whole subject.

Those persons who are inclined to play with figures or estimates of the oil and gas reserves of the country, or of any of its states, should somehow be educated to understand:

1. That the reported **proved** reserves, as of any specified date, will require a great many more years for their extraction from the ground than the reserves-overproduction quotient, as above described; and

2. That, at any given date, for a great many years to come, in addition to the **proved** reserves of that date there will be large quantities of possible reserves, some discovered and some to be discovered, and also large quantities of hypothetical reserves, many of which **possible** and **hypothetical** reserves will subsequently become **proved** reserves.

A.P.I. and A.G.A. Reserves

In the annual reports on proved reserves of oil and gas, the reserves committees of the American Petroleum Institute and the American Gas Association tabulate the data as follows:

In the first column they show the proved reserves as of the end of the previous year.

In the second column are the changes in proved reserves which are due to lateral extension of old fields, to corrections in production figures, and to revision of such factors as "sand" thickness, porosity, and permeability.

In the third column are proved reserves discovered during the year in new fields and in new pools in old fields.

Then follow three other columns showing the year's production, the estimated proved reserves as of the end of the year, and the net change, plus or minus, between these reserves and those at the end of the previous year. Every year the oil found in new fields and in new pools in old fields is much less than the oil added through extensions and revisions. Thus:

In 1937, revisions plus extensions were 3.00 times new discoveries.

In 1938, revisions plus extensions were 2.76 times new discoveries.

In 1939, revisions plus extensions were 6.04 times new discoveries.

In 1940, revisions plus extensions were 5.61 times new discoveries.

In 1941, revisions plus extensions were 3.57 times new discoveries.

In 1942, revisions plus extensions were 6.22 times new discoveries.

In 1943, revisions plus extensions were 4.25 times new discoveries.

In 1944, revisions plus extensions were 3.04 times new discoveries.

In 1945, revisions plus extensions were 4.02 times new discoveries.

In 1946, revisions plus extensions were 4.53 times new discoveries.

In 1947* revisions plus extensions were 4.38 times new discoveries.

In 1948* revisions plus extensions were 8.24 times new discoveries.

These figures on extension oil (or gas) and oil (or gas) from new discoveries are sometimes incorrectly referred to certain kinds of exploratory drilling. We classify wells drilled for oil or gas as either (1) field-development wells (i.e., wells drilled on proved units [see ante]) or (2) exploratory wells. The latter we divide into (a) those drilled on structures that have not produced (or, where structures are indefinite, those wells located more than 2 miles from the nearest producing well), and (b) those

*Includes both crude oil and natural-gas liquids.

XUM

drilled on structures already producing (or, where structures are indefinite, those which are less than 2 miles from the nearest producing well). Those under (a) we call "rank wildcats" or **new-field wildcats.** If successful, these discover new fields. Under (b), if the wells are successful, we may have those which discover new pools either above, or below, or to one side of the pools already producing, all these being new-pool discoveries; or we may have extension wells which **widely** extend a pool already producing.

Now, going back to our classification of new reserves, "extension oil" may be a combination of reserves added to the completion of field-development wells and of exploratory "extension tests" (long-distance step-outs). It does not represent either one of these types of drilling alone. It is roughly a measure of the expansion of the total producing area of the pools, discovered prior to the year of the report, through both exploratory and field-development drilling during the year reported.

Again, new proved reserves added by the discovery of new fields and by the discovery of new pools in old fields include oil found not only by new-field wildcatting ("rank wildcatting"), but also by exploratory drilling for new pools above, below, or to the side of pools already discovered and producing. The finding of these new pools in old fields is properly to be regarded as a sequel to the new-field discoveries of earlier years. The new pools augment the total proved reserves attributable to fields which were discovered before the year of the report.

To obtain a fair comparison between the quantity of new proved reserves attributable in any year to new-field discoveries and the quantity of new reserves additionally proved in that year for all fields discovered prior to that year, we would have to move the new proved oil of newly discovered pools in old fields across into the column for extensions and revisions. Just how much this fraction would be we do not know, for we do not have the necessary data. But we do know that in the 5-year period from 1944 to 1948, inclusive, there were completed 1,959 new-pool discovery wells and 1,921 new-field discovery wells. Since the proved reserves available to each well under these two classifications may vary widely, we cannot safely say that approximately 50 per cent of the new-discovery reserves are attributable to new-pool discoveries and about 50 per cent to new-field discoveries; but I should not be surprised if these two fractions varied within limits of one-third and two-thirds of the total proved reserves listed each year under discoveries of new fields and new pools in old fields.

You will observe that in this paper, I am making no attempt to suggest estimates of the quantities of oil reserves or of gas reserves which may still be present in the different geographic and geologic provinces of our continent. I can see no need of adding another set of guesses to those already available. There is no reason why I should have any better conception of what we may hope for than many others who have made carefully considered scientific guesses within recent years. What I do want to emphasize is:

1. That there are still many billions of barrels of as yet unproved oil reserves and many trillions of cubic feet of as yet unproved gas reserves on this North American continent; and

2. That the estimates of **proved** reserves of these hydrocarbons are always only a part of the supply.

Again let me repeat to all those who refer to reserves of oil or gas:

1. Define the terms as **you** are using them;

2. Be sure that your readers or your listeners know how you are using these terms;

3. Don't be fooled by that quotient of the year-end-proved-reserves divided by the year's production.

4. Be sure that if you make comparisons, you compare analogous figures; and

5. Be sure that you know the scope and meaning of the figures which you quote.

"Packaged" Gasoline Plant Is Portable

(Continued from page 62)

hour a day of the lease operator's time. The absorption-oil consumption is approximately 1 gal. per day and lubricating oil approximately 2 qt. per day.

Water makeup required for the skid unit is approximately 10 bbl. per day. The recompressor requires approximately 12,000 cu. ft. per day fuel gas and the booster 22,000 cu. ft. per day. The total shrinkage in gas volume due to extraction and fuel requirements ranges between 9 and 10 per cent of the field gas.

An inspection of Table 2 shows an operating revenue of $5,352.69 in 3 months from gasoline sales. The revenue from gas sales is not included as it should be credited to booster operation. Therefore a yearly gross revenue of $21,400 may be anticipated from gasoline sales. This revenue indicates a satisfactory return on money invested in view of the first cost and operating costs indicated above and the consideration that the plant is nearly 100 per cent salvable.

The plant has a low investment cost when processing small volumes. In such service its first cost is lower than that of a standard plant. It is realized that there is a point where this plant loses its advantage of low investment cost as the capacity requirement increases. This is true because a plot of cost against capacity will show this type plant starts with a lower first cost on small volumes but since a large portion of its cost is due to recompressor the slope of the curve is steeper and intersects the cost curve of the standard plant. This point of intersection varies to some extent with each individual problem but is approximately at a capacity of 4,000,000 cu. ft. per day. The plant is completely portable as the over-all length of the skid is 22 ft. and the width is 8 ft. This results in a much higher salvage value than can be expected from a standard-type plant.

Erection cost is a great deal less than that of a standard plant because all equipment on the skid is assembled before shipment and piping fabricated to fit. It is then knocked down for shipment.

The plant permits a producer having a small volume of gas to recover gasoline economically, and L.P.G. if desired, without the hazard of a large investment. Also, frequently a producer opens a field and waits for a year or two to determine whether the field is going to develop sufficiently to justify the installation of a large gasoline plant. By the time this becomes obvious, he may find that he has considerable competition in securing gas from all of the leases in the field.

If the producer has already installed a small plant and taken the gas as it develops, he is in an excellent position to replace the small plant with a large standard plant and have complete control of the gas in the field. The plant is licensed under Gregory patents.

BOOKS

EAST FORK-WHARTON GAS FIELD. By John R. Erbright, Charles R. Fettke, and Albert I. Ingham. Published by Pennsylvania Department of Public Affairs, Harrisburg. 70 cents.

The area considered in this report lies wholly within the northern part of the Allegheny Plateau province. The strata discussed range from the Helderberg group of lower Devonian age, the deepest formation penetrated in drilling, to the Pottsville sandstone, Pennsylvanian in age, which is present on the synclinal uplands.

MODERN ARC WELDING LESSONS AC & DC. Published by Hobert Trade School, Troy, Ohio. 192 pp. $1.

This book comprises the second part of the new five-part Hobart handbook, "Electric Arc Welding—Procedure and Practice," and contains the complete series of 40 arc-welding lessons offered at the Hobart Trade School. Chapter headings include: Preliminary Instructions; Starting and Manipulating the Arc; Welding Common Joints with Bare Electrodes, Welding Light-Gage Sheets with Coated Electrodes; General Welding with Coated Electrodes in the Flat, Horizontal, Vertical, and Overhead Positions; Pipe Welding; Welding Cast Iron; and Special Practices and Tests.

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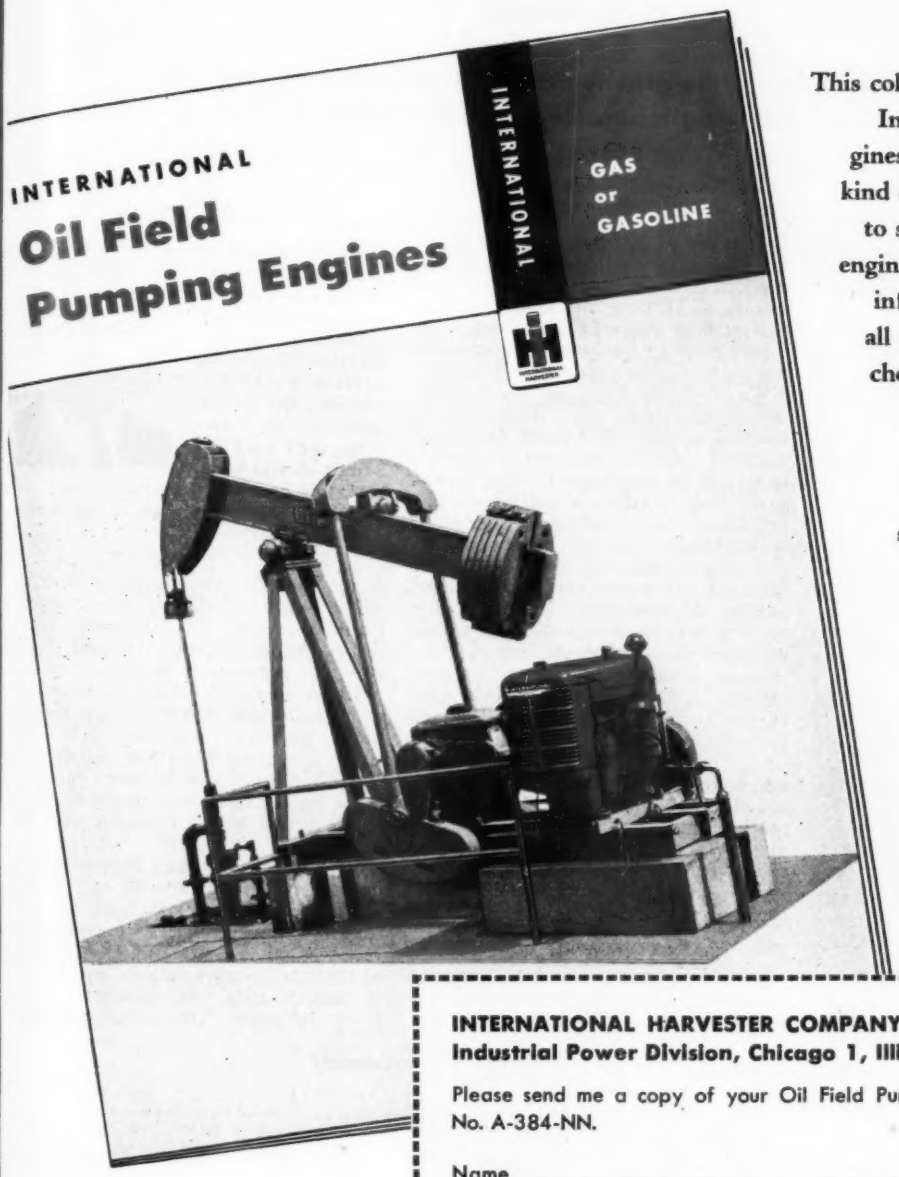

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Gravity Separation of Inactive Catalyst

by C. K. Viland

This article describes the gravity-classification system that has been installed, following laboratory experimentation, at Tide Water's Avon Plant.

INCREASING use of heavier distillates for catalytic cracking may pose new problems for the refiner. While usually attractive economically and from the standpoint of making products most in demand, the charging of these stocks often requires higher catalyst replacement rates to maintain desired throughputs and yields.

Cracking catalysts tend to deteriorate more rapidly as higher-boiling marginal feed stocks are used. Iron, nickel, vanadium, copper, and other heavy metal compounds are sometimes present, and if deposited on the catalyst, cause abnormal aging or ability to produce gasoline relative to gas and coke. This poisoning may result from even minute amounts present in the oils processed, and is cumulative in effect.

More fresh catalyst is required to maintain acceptable product distribution since any appreciable buildup of these heavy metals promotes dehydrogenation reactions. A similar but not necessarily related abnormal aging may also occur in some natural-clay catalysts from activation of the iron originating in the mineral used in its manufacture. This results when the iron reacts with sulfur compounds contained in the charge stocks changing its form, and increasing the carbon factor of the catalyst.[1]

Such loss in selectivity when cracking contaminated oil feeds, or when charging high-sulfur feeds over certain types of natural catalysts, is in addition to normal decline in cracking activity. Normal deactivation or loss in activity results from repeated exposure at elevated temperature to combustion air, steam, and hydrocarbon vapors over a period of time.

When either type of deactivation occurs, the use of more fresh catalyst than to merely offset stack and other physical losses is required if production is to be maintained. This means that some of the circulating inventory must be withdrawn. Any such withdrawal comprises proportionate parts of material of all ages in the unit, including the last fresh catalyst added. A means of selectively discarding only the oldest catalyst would be decidedly advantageous.

Most cracking catalysts become heavier as they are used. This may be due to physical changes attendant to loss in surface area which also occurs. The change in density with age suggests a method of selectively removing the oldest and least desirable particles from the circulating catalyst. When adequately accomplished, such a process upgrades the operating inventory and reduces the catalyst replacement rate.

Commercial Results

After laboratory experimentation, a gravity-classification system based on this principle was installed in the fluid catalytic cracking unit of Tide Water Associated Oil Co.'s Avon, Calif., refinery. The apparatus comprises essentially a centrifugal separator to separate a fine and coarse fraction of the catalyst, followed by a classification table which rejects denser particles from the coarse fraction. The fines from the centrifugal separator and the lighter particles from the gravity classification table are returned to the cracking unit for reuse.

This selective reject system which operates on a slip stream of the circulating inventory, has been in successful commercial use for nearly a year. While classification by gravity of relatively large pellets, particularly natural catalysts, has been practiced in some Thermofor catalytic

THE AUTHOR

C. K. Viland is general supervisor of the research and development department in the western division of Tide Water Associated Oil Co. A graduate of Colorado School of Mines, he has been with his company since 1929. He is located at the Avon, Calif., refinery.

TABLE 1—TEST ON CATALYST CLASSIFICATION EQUIPMENT

Input:	Sample width (in.)	Lb./hr.	Rate per cent	Bulk density	U.O.P. weight activity	Particle size—Mesh +60	60-100	100-200	—200
Slip-stream feed to classification equipment		*4,165		0.85	22	0.6	4.8	36.1	58.5
Output—First Stage (Air Separator):									
Fines		*2,940	70.6	0.82	22	0.6	1.0	25.9	72.5
Coarse		1,225	29.4	0.91	21	2.2	17.2	61.3	19.3
Output—Second Stage:†									
Discharged (A-D below)	18½	389	31.8	1.03	18	6.3	34.4	52.9	6.4
Returned (E-G below)	16½	565	46.1	0.84	23	0.2	8.4	65.7	25.7
Returned (H-L below)	27½	271	22.1	0.86	23	0.5	13.3	65.2	21.0
Samples from discharge edge of S. S. & S. table:									
A Discharged	2	31	2.53	‡1.54	5				
B Discharged	5½	103	8.42	1.07					
C Discharged	5½	104	8.50	0.93					
D Discharged	5½	151	12.32	0.85					
E Returned	5½	180	14.70	0.84					
F Returned	5½	179	14.60	0.83					
G Returned	5½	206	16.80	0.83					
H Returned	5½	91	7.43	0.82					
I Returned	5½	61	4.98	0.83					
J Returned	5½	38	3.10	0.82					
K Returned	5½	33	2.70	0.82					
L Returned	5½	48	2.92	0.80					
Total		1,225							

*Rates calculated. †Gravity classifier, processing coarse cut. ‡Bulk densities on samples A-L are on uncalcined basis

cracking units, this is believed to be the first commercial application of the discarding of higher density and lower activity fluid-type catalyst from a mixture.

In this installation, the separation of low-activity catalyst particles has been applied to mixtures of catalysts having different densities, such as natural and synthetic, as well as to cracking catalyst all of a single type. Selective separation of low-activity catalyst from mixtures appears feasible.

Test data on the Avon classification equipment may be summarized as shown in Table 1. Briefly stated, when processing a slip stream of about 50 tons per day of whole fluid catalyst, the coarser fraction comprising about 15 tons daily or 29.4 per cent was subjected to further separation by density. The coarse fraction so treated comprises particles generally larger than 200 mesh. As shown in the table, about 4.7 tons daily of the heaviest particles equivalent to 9.3 per cent of the feed to the system was rejected.

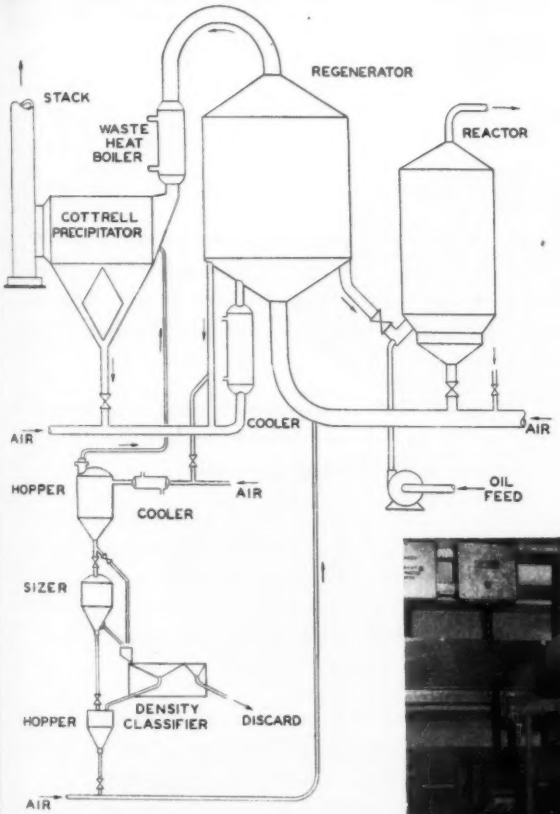
This latter separation is accomplished in a baffled shaker table where the lighter catalyst particles are floated by air and withdrawn at one end and the heavier particles sinking to the deck are conveyed to the other end. This reject material had a U.O.P. weight activity of 18 as compared to 22 for the whole catalyst, 22 for the fines returned, and 23 for the lighter material recovered by the table. This test data was obtained when the circulating inventory was 100 per cent natural catalyst of the montmorillonite type.

In the initial operation of the classifier, the reject material contained about 1 per cent of magnetic iron presumably accumulated over a period of time from erosion of steel in the unit, and also showed appreciable amounts of ordinary sand. It is interesting to note that after about 2 months' operation, the content of magnetic iron had dropped to a figure of less than 0.2 per cent, and the amount of sand which had accumulated in the circulating inventory was also diminished.

Operation on Two-Component Mixture

Sometime after the catalyst classifier had been placed in service, it was decided to start adding synthetic silica-alumina catalyst to more rapidly improve product distribution. The heavy-oil feed of about 22° A.P.I. gravity and containing 0.8 per cent sulfur was apparently activating the 1.8 per cent of iron in the montmorillonite-type natural catalyst quite rapidly and it was undesirable to reject at a higher rate.

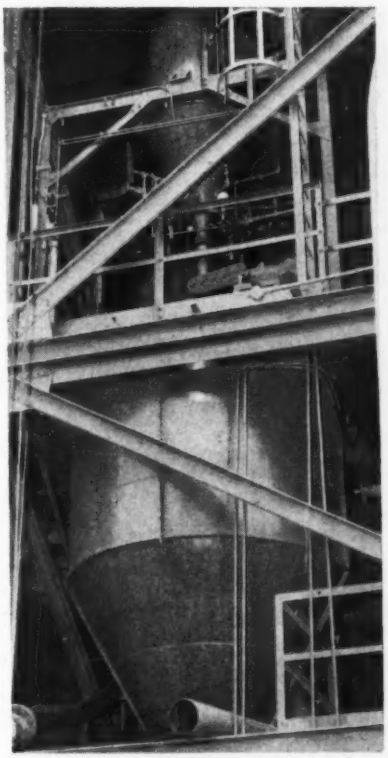
A mixture of natural and synthetic silica-alumina catalysts is ideally suited to gravity separation as indi-

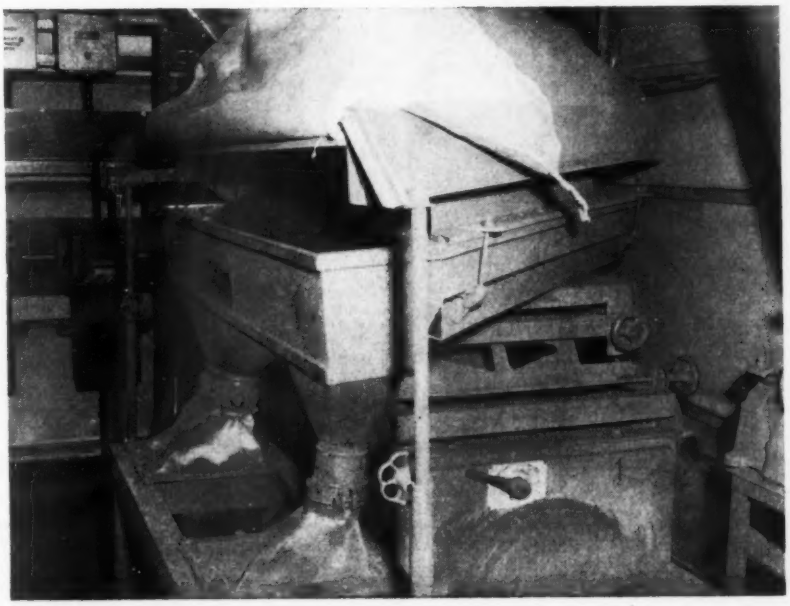


Left: Flow scheme of a system for classification of fluid cracking catalyst.

Right: Feed hopper and air classifier.

Below: Gravity classification table.





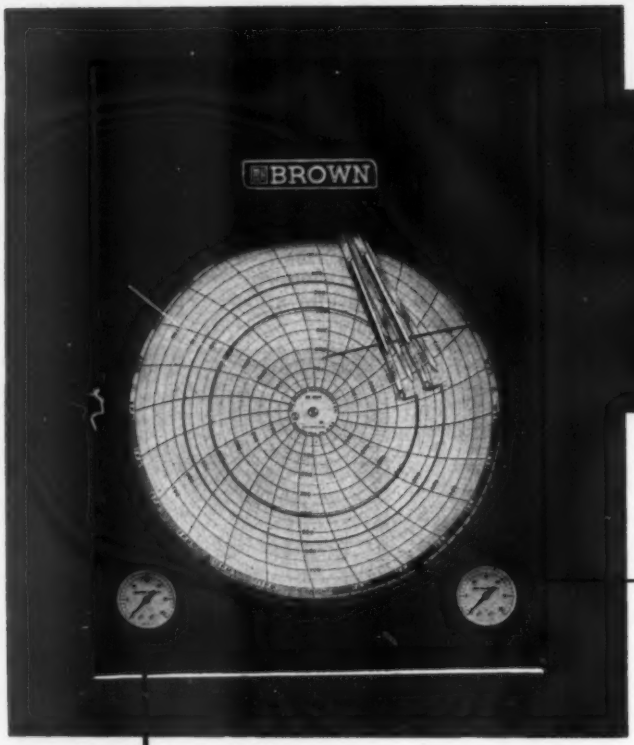


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TABLE 2

	Particle density		Apparent bulk density	
	Fresh	Used	Fresh	Used
Natural catalyst (montmorillonite type)	1.2	1.4	0.72	0.85
Synthetic (microspheroidal silica-alumina)	0.8	0.9	0.5	0.6

cated by the physical characteristics outlined in Table 2.

During the period this mixture of catalysts was being processed, inspections by petrographic microscope as well as data from activity determinations indicated that the reject material was substantially all the older natural catalyst. Retention of most of the silica-alumina catalyst in the system was considered desirable as it is more active and also not subject to sulfur poisoning. However, the use of more catalyst than merely required to offset losses was considered necessary because of the heavy metals contained in the oil feed.

The normal charge at Avon contains about 4 p.p.m. of iron, and 0.4 p.p.m. each of nickel and vanadium. Since these metals will build up on the catalyst to undesirably high figures at minimum catalyst replacement rates, it is economically desirable to use some low-cost natural catalyst because of its dilution effect. This higher makeup reduces the amount of heavy metal contamination on the circulating inventory.

Typical reject material, when using a mixture of the above catalysts, was about three units lower than the average circulating catalyst, expressed on the U.O.P. weight scale of activity. When processing 50 and rejecting about 2 tons daily of heavy catalyst, normal losses plus the selective withdrawal balanced to a satisfactory makeup rate. At the same charge rate of approximately 22,000 bbl. daily of heavy vacuum distillate and at unchanged coke-burning rate, this combination of catalysts with the selective rejection the older natural-clay material increased the production of gasoline and butane fractions by about 1,500-2,000 bbl. daily.

Operation on Three-Component Catalyst Mixture

Shortly after the commercial run with the two component mixture of high-iron montmorillonite-type natural catalyst and synthetic silica-alumina microspheres, a new low-iron natural catalyst became commercially available.[2] This sulfur-resistant catalyst, reported to be processed from the clay-mineral halloycite, differs materially from catalysts heretofore used. Some of the comparative properties of fresh fluid type catalysts are given in Table 3.

Laboratory aging tests of fresh sulfur-resistant catalyst indicated the new natural material had improved aging characteristics as compared to that produced from montmorillonite. Further, fluid pilot-plant work simulating commercial operations at Avon showed that plant-aged samples would give product distribution approaching that obtainable from synthetic silica-alumina catalyst.

Because of these favorable indications and its attractive price, it was desired to give the new type of natural catalyst a commercial test. Recognizing the difficulties which would be involved in selectively discarding the least desirable montmorillonite catalyst from the mixture, it was decided to purchase the new sulfur-resistant catalyst of finer grind so that it would be returned to the fluid unit in the preliminary sizing separation, and not be subject to the final gravity separation.

This plan was successful as subsequent test data showed. The new sulfur-resistant catalyst, while of lower numerical activity, gives a desirable product distribution provided reactor space velocity is properly adjusted. This lower activity of the fresh sulfur-resistant catalyst renders ordinary activity testing of little value in determining what type of catalyst was being discarded. It was therefore decided to take a series of samples which would be tested for product distribution in a fluid pilot plant in which processing conditions of the commercial unit could be duplicated.

Material being discarded from the unit was found to give a less-favorable product distribution than equilibrium catalyst as indicated by the comparison, Table 4.

These comparative data were obtained in a midget fluid catalytic cracking unit charging the same feed stock in all cases. The comparisons are made at a conversion of 50 per cent using plotted data from several runs on each catalyst sample.

From Table 4, it is apparent that a small proportion of coarse but desirable sulfur-resistant catalyst was being lost in the heaviest reject cut; however, because of purchase specifications, this was not of great magnitude. The composite reject stream was definitely poorer than the circulating inventory, and its withdrawal was improving the average quality.

TABLE 3

	Synthetic silica-alumina	Montmorillonite-type natural	Sulfur-resistant natural
Specific surface—Sq.M./g.	600+	300	135
Activity—U.O.P. weight	100+	45	24
Alumina—per cent	13	15	40
Iron—per cent	0.03	2	0.4
Bulk density	0.5	0.7	0.9
Particle density	0.8	0.9	1.45

Equipment and Design Conditions

Catalyst processing in the classification equipment is as follows:

Regenerated catalyst is withdrawn from the recycle cooler standpipe at rates up to the design maximum of 5,550 lb. per hour. Temperature of the catalyst at this point is in the order of 1,100° F. and the pressure available is about 6.5 psig. Flow is through a hydraulically actuated slide valve in the feed line, which is actuated by a differential pressure-recorder-controller holding a predetermined level in the upper or feed hopper.

A catalyst cooler is provided between the slide valve and the hopper. This consists of a 4-in. pipe coil immersed in cooling water, and cools the hot powdered catalyst to a temperature of about 200° F. The hopper is equipped with a baffle behind the inlet nozzle to deflect the flow of cooled catalyst downward. A single multiclone tube is provided at the top of the hopper, and the carrying air and entrained fines leaving the hopper are vented into the inlet breeching to the Cottrell precipitator. Catalyst withdrawn from the hopper for further processing is controlled by means of a rotary feed valve.

Design conditions for the feed-preparation section of the classification equipment are as follows:

Flows—	
Regenerated catalyst from standpipe, lb. per hour	5,550
Catalyst to air classifier, lb. per hour	5,000
Catalyst to Cottrell precipitator, lb. per hour	550
Carrying air, 15 psig., Std. cu. ft. per minute	45
Industrial water, g.p.m.	26
Temperatures—	
Recycle standpipe, °F.	1,100
Cooler inlet, °F.	1,070
Cooler outlet, °F.	200
Hopper, °F.	200
Industrial water in, °F.	70
Industrial water out, °F.	150
Carrying air, °F.	90
Pressures—	
Recycle standpipe, psig.	6.5
Slide valve differential, psig.	2.7
Cooler inlet, psig.	3.7
Cooler outlet, psig.	1.2
Hopper inlet, psig.	1.1
Hopper outlet, psig.	0.3
Cottrell breeching, psig.	0.1

Catalyst from the upper feed hopper flows through the rotary valve into a Gayco Model 44, size 8 centrifugal air separator. This classifies the catalyst particles according to size into two streams, a fine fraction predominantly smaller than 200 mesh and a coarse cut mostly of larger size. The fines stream gravitates into the lower hopper from which it is returned to the operating inventory of the fluid catalytic cracking unit.

The coarse cut is fed to the oscillating deck of a CS-200 Sutton, Steele,

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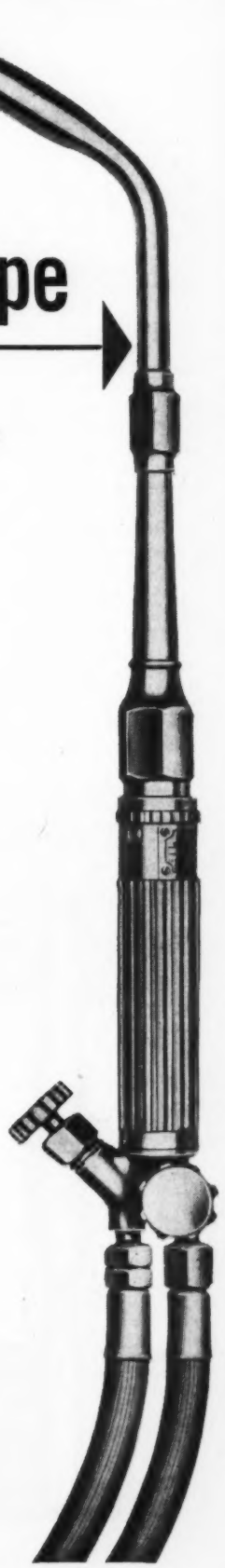

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TABLE 4

Test	Tons per day	Bulk density	Activity U.O.P. weight	Gasoline-to-coke ratio
Test 1—				
Circulating catalyst		0.868	28	7.58
Lightest reject	1.8	0.857	28	6.94
Heaviest reject	0.9	1.01	17	7.25
Test 2—				
Circulating catalyst		0.855	27	7.25
Lightest reject	1.4	0.877	28	5.87
Heaviest reject	1.0	0.970	22	7.10

and Steele gravity-separation table. This deck is covered with a screening device. Air supplied in controlled volume by a centrifugal fan is delivered up through a baffling system and through the deck to exert a continuous air lifting effect on the particles. Heaviest particles sink to the deck and are conveyed up to and discharged at the upper end of the deck. Lightest particles are floated out at the lower end. Catalyst particles of intermediate weight are discharged according to their gravity between these two points. Variation in separation may be controlled by changing the deck inclination, the speed of vibration, the air volume, and the adjustment of the cutting fingers.

The heavy catalyst from the gravity-separation table gravitates into Dempster Dumpster bucket where it is gaged and hauled away when full.

The lighter catalyst from the table gravitates into the lower hopper along with fines from air classifier.

Level in the lower hopper is maintained by a differential pressure-recorder-controller which actuates a hydraulically controlled slide valve at the bottom of its standpipe. This discharges into a riser connecting into the main regenerator riser pipe. Carrying air is injected from the 15-lb. air system through a manually controlled valve, and the rate is set by flow indicator. Aeration air is provided at three points in the hopper standpipe and also into the bottom of lower hopper. This air is disengaged at the top and passes through a cyclone into the atmosphere. Flow of this air is assisted by an exhauster. Catalyst particles recovered by the cyclone are returned to the entry line gravitating into the hopper by means of a rotary feeder valve.

Design conditions for the classification equipment are as follows:

Flows—	
Catalyst to air classifier, lb. per hour	5,000
Coarse catalyst to table, lb. per hour	1,000
Fines from air classifier, lb. per hour	4,000
Table discard, lb. per hour	350
Table return, lb. per hour	600
Catalyst to cyclone, lb. per hour	50
Catalyst to atmosphere, lb. per hour	5
Cyclone bottoms, lb. per hour	45
Hopper bottoms, lb. per hour	4,845
Exhauster air, std. cu. ft. per min.	2,000
Carrying air to regen. riser (15 psig.), cu. ft. per min.	40
Temperatures—	
Catalyst to air classifier, °F.	200
Catalyst to table, °F.	200
Hopper, °F.	200
Carrying air, °F.	250
Pressures—	
Air classifier, psig.	0
Cyclone, in. H_2O vacuum	3
Hopper, psig.	0
Above slide valve, psig.	12.5
Below slide valve, psig.	10
Regenerator riser, psig.	9

Power requirements of the classifaction facilities are quite low, the preliminary separator being driven by a 7½-hp. electric motor. The gravity table is operated by 7½-hp. motor and is equipped with a 3-hp. exhauster and a ½-hp. feeder. Upper rotary feeder is driven by a 1-hp. motor.

At the present time, fresh makeup to the Avon fluid catalytic cracking plant comprises mixed synthetic silica-alumina microspheres and sulfur-resistant natural catalyst. The amount and proportion of each are governed by desired product distribution, the amount of harmful contaminants present in the oil feed stock, and availability.

Currently the older intermediate-density montmorillonite-type of natural catalyst is being selectively rejected by purchasing the heaviest fresh catalyst of smaller particle size. When the operating inventory is substantially all synthetic and sulfur-resistant natural catalysts, classification-control problems should be simplified, and it should be possible to purchase both fresh catalysts of the most desirable particle size.

Separation of catalysts according to density offers a practicable means of selectively discarding the most inactive particles from a circulating inventory. Advantages of a two-component catalyst system with provisions for selective rejection based on differences in density are (1) ability to "wash" heavy metallic contaminants out in a less-expensive catalyst; and (2) better control of product distribution, both from the standpoint of maximizing the gasoline to coke ratio which effects volumetric production, and ability to change volatility of the gasoline fractions as required by seasonal specifications or requirements for alkylation feed stocks. It also permits better control of size of the catalyst as rejected particles are all larger than 200 mesh.

The gravity-classification system also permits the changing over to a single catalyst component in an orderly manner if and when conditions warrant, and thereupon the oldest and least active catalyst can be withdrawn selectively with attendant savings.

References

1. Mills, G. A., Industrial and Engineering Chemistry, Vol. 42, No. 1, January 1950, pp. 182-187.

2. Thomas, E. Jackson, The Oil and Gas Journal, March 23, 1950, pp. 221-228.

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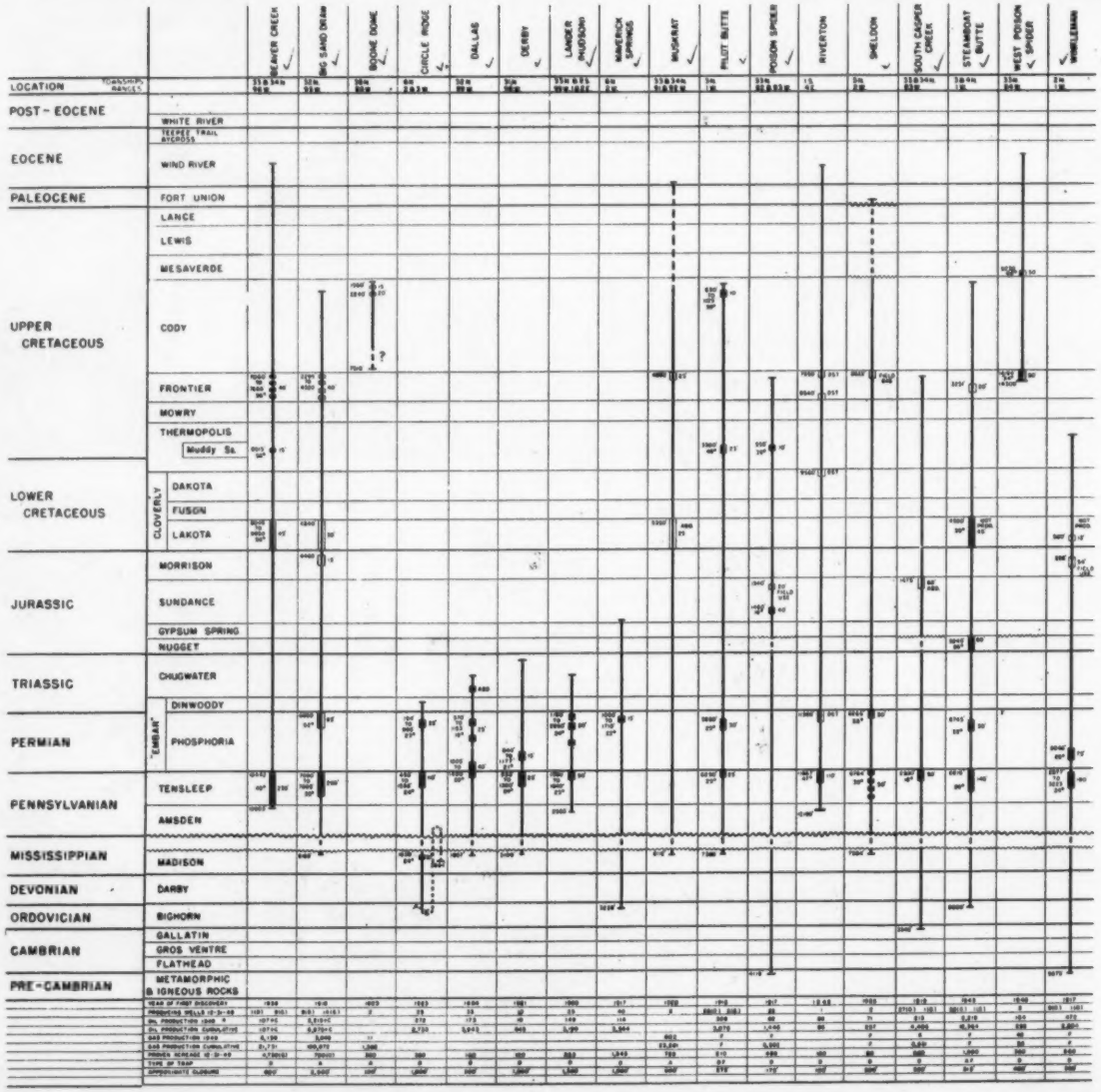
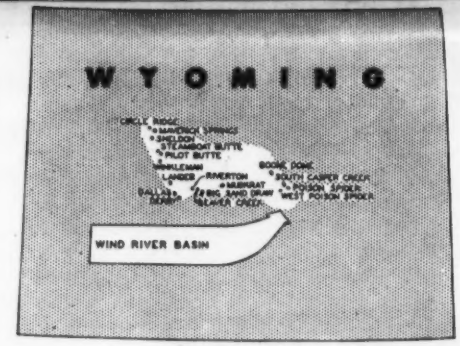
Wyoming Correlations — Penetration Chart for Wind River Basin Fields





EXPLANATION

Approximate geologic horizon exposed on surface of crest of structure

Oil producing zone
Depth (average or minimum and maximum)
Gravity of oil (average thickness shown on the right)

Gas producing zone

Oil and gas producing zone

Gas and condensate producing zone

Section missing

Deepest penetration

*Some wells start in Hillard overthrust on Wasatch. One to several oil or gas zones.

Producing wells include active wells only (O) = Oil. (G) = Gas.

Proven acreage is usually of the largest pool.

Oil production is in thousands of barrels.

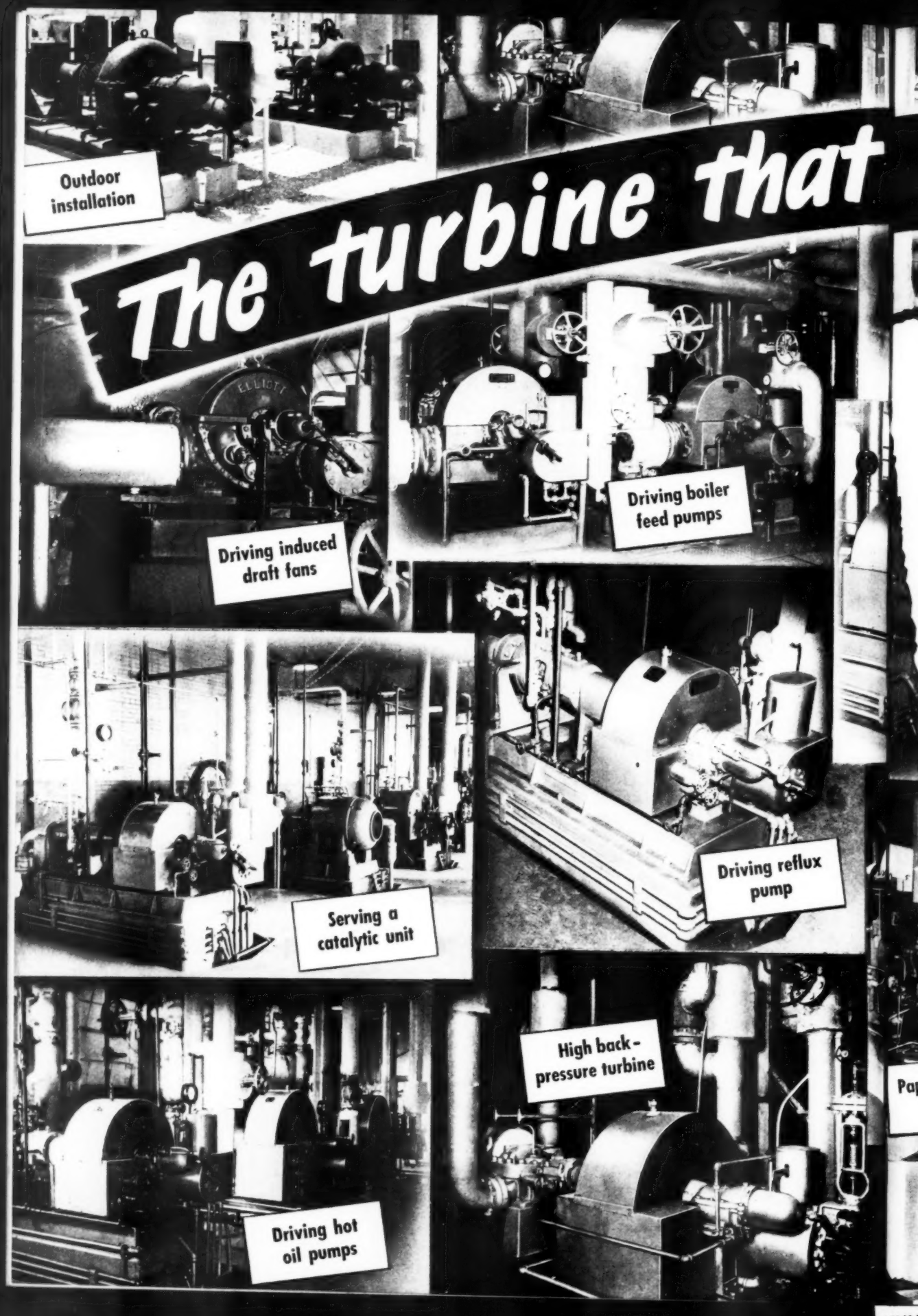
Gas production is in millions of cubic feet.

C = Condensate. Amount not available.

Abbreviations Under Type of Trap

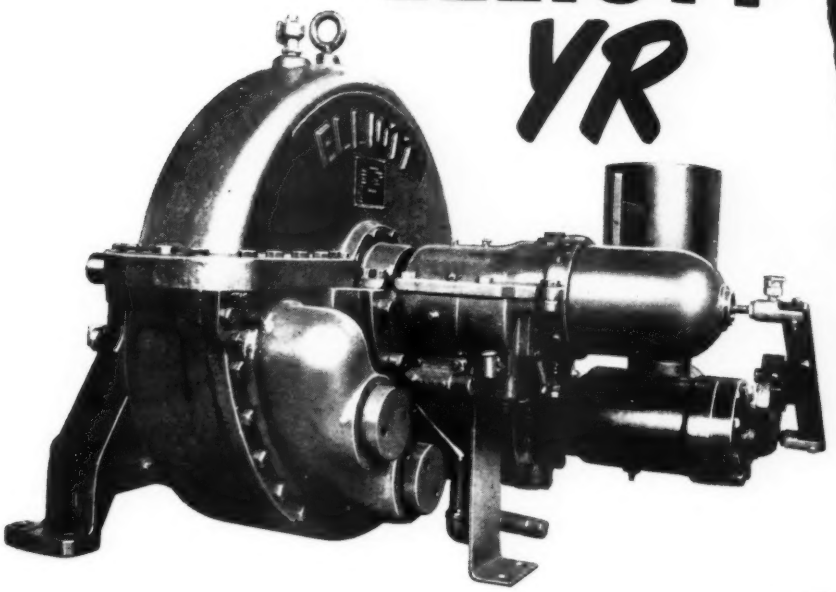
A = Anticline	M = Monocline
AF = Faulted anticline	T = Terrace
	MU = Monoclinal unconformity
D = Dome	
DF = Faulted dome	FT = Fault trap
D(2) = Double dome	N = Nose

Compiled by a Nomenclature Committee of the Wyoming Geological Association.


The turbine that
Outdoor installation
Driving induced draft fans
Driving boiler feed pumps
Driving reflux pump
Serving a catalytic unit
High back-pressure turbine
Driving hot oil pumps

t everyone likes...

ELLIOTT YR



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H-730

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Gas Transmission-Line Maintenance

Good foremen, well trained and alert, are a vital key for proper execution of maintenance programs. This report discusses the principal qualifications of good foremen.

by L. W. Curfman

ONE of the most valued services in a company is the maintenance of its network of gas-gathering and transmission lines. This is true despite the fact that the auditor, in making his annual report for the stockholders at the end of the year, does not show any profit from the maintenance of a gas-transmission line. The maintenance crew's value is the money saved. If a true audit on profits could be shown, the owners would be astounded at the figure which proper maintenance brings in for a company when the year ends. In this article the writer presents the scope of the foreman's duties in this service, as well as a few pointers picked up in that capacity on high-pressure gas pipe lines.

First, let's consider some of the qualifications of the maintenance foreman on a gas line. He should be a fellow who "keeps his head in the game" at all times. This is the only way that he can keep abreast of his duties and responsibilities. When there is something that needs repair his job is much like that of a doctor. First he must diagnose the cause of the trouble, and then use his technical knowledge and experience to remedy the situation. He must know what to do and how to do it, must be familiar with the tools required to make the repairs and how much labor will be needed.

The foreman can do a better job if he personally observes the situation before starting the project. The best policy a supervisor can follow in proper maintenance is: When there is a leak, washout, or any repair to be made, do it now and do not put it off for any reason. Most big troubles come from some small item which has been neglected because it was classified as being of minor importance.

Now let's think of personnel for a moment. The line of authority in any maintenance setup is something like this:

SUPT. OF MAINTENANCE
(Entire gas line)
|
AREA FOREMAN
/ \
GANG MEN (Generally 3) — LINE WALKERS (Generally 2)

In case of emergency the line walkers can become gang men and therefore the foreman will have a crew of five men.

The amount of personnel required depends on the pipe mileage to be covered. Under ordinary circumstances one would need a foreman, two line walkers, and a three-man repair gang for each 200 miles of pipe line. The following table illustrates this principle, but allowances must be made for terrain:

Miles of pipe line	Foremen	Line walkers	Gang men	Total maintenance crew
200	1	2	3	6
400	2	4	6	12
600	3	6	9	18
800	4	8	12	24
1,000	5	10	15	30
1,200	6	12	18	36
1,400	7	14	21	42
1,600	8	16	24	48
1,800	9	18	27	54
2,000	10	20	30	60

A maintenance foreman should not have too many miles of line under his supervision. Let the maxim figure be 200 miles for each foreman. Leaks on a gas pipe line should be his simplest item in proper maintenance. There are not many leaks, thus neglect of them is virtually unpardonable.

Each line walker can cover approximately 10 miles each day. This will give a full coverage of the entire line every 2 weeks. A daily line walker's report should be made to the foreman.

There are many things a line walker has to be on the alert for in covering a gas pipe line. Leaks in gas line, washouts in canal or river crossings, right-of-way obstructions, new pipe lines being laid that cross the gas line, canal or drain-ditch work with heavy equipment which crosses the gas line, and anything that would come in contact with the gas line or gas-line ditch.

The main-line crews and the personnel at the various compressor stations must realize the extent of their respective jurisdiction. To state it briefly, the fences around the compressor stations form a set boundary. The main-line maintenance crews are responsible for the main line outside of the compressor-station fence.

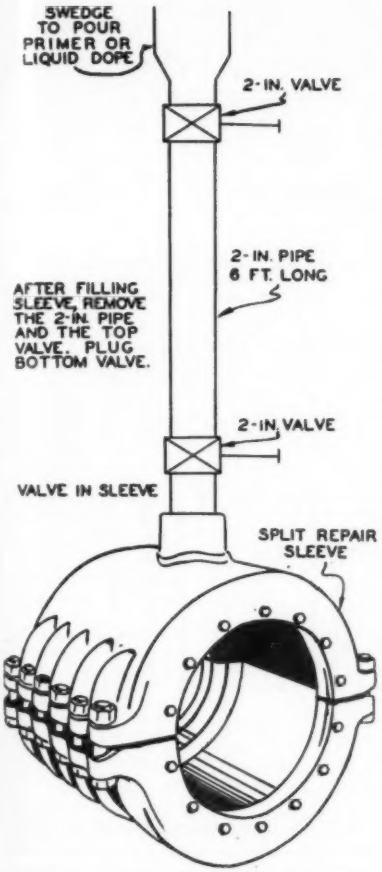
It is almost a physical impossibility for a foreman and a crew of five to keep in close touch with 200 miles of gas line, without some cooperation from outside his immediate organization. There are numerous ways to obtain needed information when an obstruction occurs on the gas pipe line.

The most effective practice a crew can make is being courteous and on good terms with the landowner whose land the pipe line crosses, or the tenant who is in charge of the property. If this is done, the landowner or tenant will, in most cases, take an interest in the line. Anything reasonable done to help the owner or tenant will redound to the company's benefit. This is simply a matter of good public relations. The company has full-time men with nothing else to do but sell the company to the public, but that responsibility trickles on down to the lowest paid employe. Poor public relations on the part of these men can cost the company more than the public-relations and legal department can repair. This factor does not show up on that annual auditor's report to the board of directors either but it's there just the same.

Valuable information that the foreman should always keep looking for includes tips about new roads, new canals, new pipe lines, or anything new in nature which might cross the gas pipe line. This may be obtained

THE AUTHOR

L. W. (Bear) Curfman is with the producing division, Magnolia Petroleum Co., Beaumont. Curfman joined Magnolia in the gas-pipe-line department in 1936, after graduation from Texas Technological College with a B.S. degree in engineering. While attending Texas Tech he received honorable mention for All-American football player in 1934. After working 3 years in a natural-gasoline plant he was made foreman in charge of gas fuel lines to drilling rigs. In 1941 he was called to help in design and construction of the high-pressure gas pipe line from Vanderbilt to Beaumont, Tex. After completion of this 14 and 16-in. line he was made foreman for this line.


SWEDGE TO POUR PRIMER OR LIQUID DOPE
2-IN. VALVE
2-IN. PIPE 6 FT. LONG
AFTER FILLING SLEEVE, REMOVE THE 2-IN. PIPE AND THE TOP VALVE. PLUG BOTTOM VALVE.
2-IN. VALVE
VALVE IN SLEEVE
SPLIT REPAIR SLEEVE

Use of split sleeve in repairing leak, whereby interior of sleeve is protected by "lubricating in" dope primer.

early from news stories and official releases that appear in the county newspapers. After getting the first lead on any new developments affecting his line the foreman can follow up for further information at the proper source.

As we gain experience we invent some methods that may be of value to someone else with similar responsibilities. One of the writer's original ideas involves repairing a leak where a split sleeve is required. In order to save a shutdown it is imperative to protect the pipe inside the repair sleeve after the sleeve has sealed off the leak. This can be accomplished by putting on a 2-in. valve at the vent in the sleeve and then placing about 6 ft. of 2-in. pipe in the valve, in an upright position, with another 2-in. valve on the other end of the pipe. Then with the valve on the sleeve closed, fill the pipe through the open valve at the top of the 2-in. line with pipe-line dope primer or liquid soft dope. By closing the top valve and opening the valve on the sleeve, the pipe-line primer or dope will fill the entire split sleeve clamp. When this is accomplished (after repeating the above operation a few times) remove the pipe and and top valve. This procedure will also seal off any small seeping leaks which might develop in the end gaskets.

Gas Treating Process

(Continued from page 64)

the treatment of relatively high-temperature gas streams up to about 200° F. It also shows promise for liquid-hydrocarbon treating because of the insolubility of the potassium phosphate in such media. A recently described installation reduces the hydrogen sulfide content of liquefied petroleum gas from 250 to 1.7 grains per 100 standard cubic feet at 300 psig. and 100° F.

Processes based upon the use of ethanolamine solutions have gained wide acceptance for the treatment of natural and refinery gases. As these processes are well known and have been adequately described in the literature, no discussion of their basic principles will be given here.

The amines in general use include triethanolamine, diethanolamine, and monoethanolamine. Triethanolamine was the first to find commercial application but has been largely replaced by the others because of its relatively poor hydrogen sulfide-removal efficiency. Diethanolamine is frequently used for the treating of refinery gas streams because of its resistance to deactivation by carbon oxysulfide and carbon disulfide and its relatively low vapor pressure; however, it is not as efficient for H_2S or CO_2 removal as monoethanolamine. The latter amine is used for the treatment of vast quantities of natural gas, frequently in combination with diethylene glycol to provide simultaneous purification and dehydration. The installed capacity of plants in use or under construction which use the combination glycol-amine system now amounts to over 850 million standard cubic feet per day. The flow arrangement which is essentially the same for both aqueous amine and glycol-amine plants, is shown in Fig. 4.

A recent development in this field is the specification of the glycol-amine system for certain cases where dehydration is not of particular importance, primarily on the basis of its lower steam requirement for stripping. In a typical installation, for example, a glycol-amine plant will require approximately 1.4 lb. of steam per pound of acid gas absorbed while a conventional plant using an aqueous solution would require approximately 2.5 lb. of steam in the same service.

The foregoing includes steam to heat the solution to the reboiler temperature, provide the heat of reaction, and volatilize sufficient water to provide the required amount of stripping vapor and is based upon a temperature approach of 40° F. in the solution heat exchanger. This advantage in operating cost is partially compensated for by the fact that the higher viscosity of the glycol-amine solution reduces the heat-transfer coefficients so that larger heat-exchanger equipment is required, and in general the most suitable process for each installation must be determined on the basis of an economic study.

Several modified flow schemes have been developed for both aqueous and glycol-amine systems. In the split-flow aqueous amine cycle, for example, the still is divided into two sections so that a partially stripped and a completely stripped solution stream are obtained with considerably less steam than would be required completely to strip the entire liquid stream. The very lean solution is then pumped to the top of the contactor to provide a final cleanup of the gas and the partially stripped solution is admitted at an intermediate point. Although the steam consumption is decreased materially by this scheme, the initial plant investment and process complexity are increased and the process has not found very wide application.

A flow scheme which lends itself very well to gasoline-plant installations has been developed, based upon the use of two streams of glycol-amine solution. The main stream which has a relatively high amine and water content is used for treating the sour "wet" gas feed to the gasoline plant in order to eliminate the necessity of handling sour gas and liquid products in this unit. This main glycol-amine stream is stripped in a conventional still and reboiler combination. A small side stream of solution is removed from the reboiler and concentrated to a low water content in a second heater with the vapor being fed to the main still. This small stream is then used for dehydration and final cleanup of the sales gas leaving the gasoline plant. In some instances most of the monoethanolamine as well as the water is distilled off the glycol so that losses of amine by vaporization in the gas stream are minimized.

A large amount of research and development work has recently been conducted in the field of corrosion of gas treating plant equipment. Although this problem is far too complex to warrant a discussion at this time, it may be noted that corrosion of steel equipment in amine plants frequently takes place in the region of highest temperature where stripping occurs. In the case of aqueous monoethanolamine plants this is generally on the tubes in the reboiler; while in glycol-amine systems the solution is almost completely stripped before it enters the reboiler from the still so that the point of highest temperature where stripping occurs is on the rich solution side of the tubes of the heat exchanger nearest the still. Laboratory research substantiated by the installation of small test heat exchangers and test tubes

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in commercially operating units has indicated that aluminum alloys (2S and 3S) are surprisingly resistant to corrosion in this service and full-sized aluminum tube bundles are now being installed.

Aluminum is not generally applicable to aqueous monoethanolamine plants because of its solubility in completely lean, hot, aqueous solutions; however, the experiments indicated that the presence of carbon dioxide in aqueous solutions provides considerable protection for aluminum. The above research also indicated that 4-6 Cr.-½ Mo. steel would be suitable for glycol-amine plant heat-exchanger tubes with regard to corrosion resistance although not as attractive economically as aluminum.

In conclusion, it may be noted that the general trend in the large-scale purification of natural and refinery gas streams has been toward the utilization of ethanolamine solutions and combination glycol-amine systems. A number of improvements have been developed in the amine gas-treating processes resulting in higher treating efficiency, greater economy of operation, and reduced deterioration of plant equipment due to corrosion.

World's Most Powerful Barge-Mounted Rig

(Continued from page 67)

electrohydraulic governors to control the speed of the diesel engines. They also limit torque on the engine to such a value that the engine can never be overloaded at any speed.

The governor differs from other oil relay governors in that the supervisory control power is furnished from a three-phase 40-watt a.c. tachometer generator driven off the engine instead of the usual media of flyballs or weights.

The drilling barge on Rig 20 has a steel wood-sheathed twin hull and is 120 ft. long by 56 ft. wide and 10 ft. deep. Major equipment items mounted on the barge are as follows:

One four-speed draw works rated for 1,450 input horsepower and powered by 1,000-hp., 525-volt, d.c. motor.

One dynamatic-type 60-32 electric brake.

Two 220-P pumps each powered by a 600-hp., 350-volt, d.c. motor.

One 612-P mud-mixing pump powered by a 160-hp., 350-volt, d.c. motor.

One centrifugal mud mixer powered with a 20-hp., 120-volt d.c. motor.

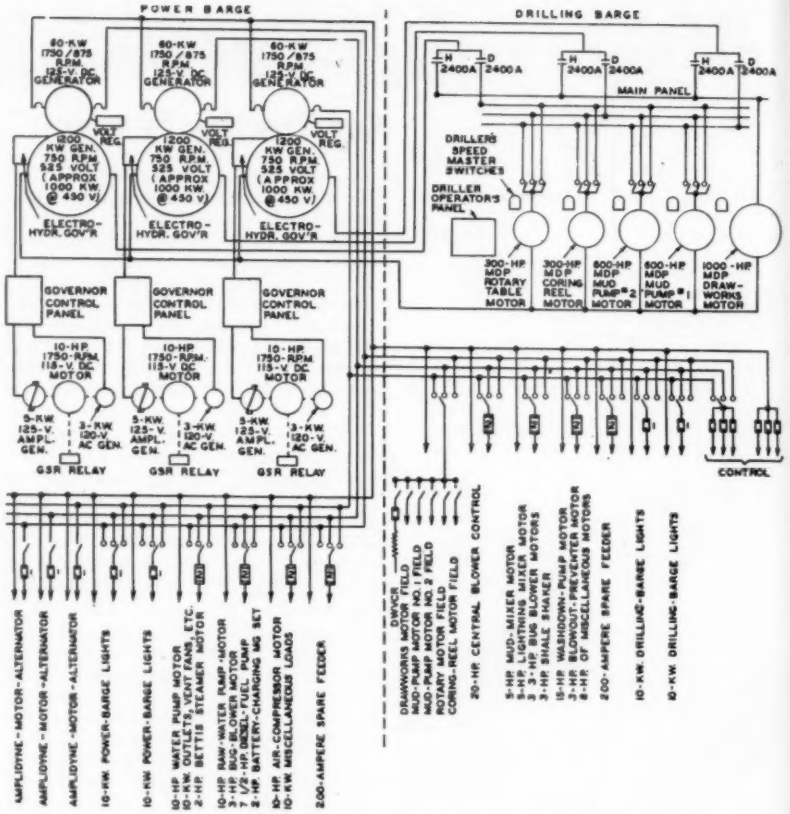
One 27½-in. type "A" rotary powered by 300-hp., 350-volt., d.c. motor.

One large coring reel powered by 300-hp., 350-volt, d.c. motor.

Three 60-kw., 125-volt auxiliary generators.

One 25-kw., 125-volt standby diesel-electric set.

The slush pumps, rotary, coring reel, draw works, and mud-mixing pump are powered by the three main generators. All other equipment is powered by the three 60-kw., 125-volt auxiliary generators.



Schematic arrangement of electrical hookup for Humble's diesel-electric drilling rig. Principal equipment items included in the diagram consist of: three 1,150-hp., 750-r.p.m., 2-cycle diesel engines; three 1,200-kw., 750-r.p.m., 525-volt generators; three sets of amplidyne motors; three auxiliary generators; one 1,000-hp. draw-works motor; one 600-hp. mud-pump motor; one 300-hp. mud-pump motor; one 300-hp. rotary-table motor; one 300-hp. coring-reel motor.

It is interesting to note that an amplidyne system is used to vary the field excitation in the electric brake on the draw works. This provides a more sensitive control than the conventional four-point control.

A tachometer generator driven directly off the drumshaft and connected into the amplidyne system provides a constant block speed characteristic for the braking system. The desired braking effect is selected by a hand rheostat at the driller's position with the brake control set on tachometer position. When the block begins to fall it will momentarily pick up speed. This speed increase results in a slight increase in the speed of the drum paying off the line. This in turn accelerates the small tachometer generator. When the generator speeds up, its output is increased, and this automatically increases the brake excitation and retards the falling block.

The driller can thus set the rheostat at the desired position and run 10 or 15 stands without further adjustment. The hand control mounted on the brake lever is also provided with a "full on" position. This permits the driller to momentarily retard the fall of the block with full braking power, and also permits instantaneous full braking power when slips are set on the stand of pipe.

References

1. "World's Largest Diesel-Electric Drilling Barge," Leigh S. McCaslin, Jr., The Oil and Gas Journal, March 9, 1950, p. 68.
2. "World's Largest Power Rig Drilling Barge," Leigh S. McCaslin, Jr., The Oil and Gas Journal, December 15, 1949, p. 69.

BOOKS

MINERAL COMMODITIES OF CALIFORNIA. Prepared by the staff of the Division of Mines, under the direction of Olaf P. Jenkins. Published by the Department of Natural Resources, San Francisco, as Bulletin 156. 443 pp.

The subtitle of this book, "Geologic Occurrence, Economic Development, and Utilization of the State's Mineral Resources," indicates its broad scope and practical nature. Its appearance is particularly timely since this is a period of industrial expansion of the state. The volume reviews by means of separate technical papers the entire mineral industry of California; over 80 different kinds of raw mineral materials are discussed, nearly all of which, during times of favorable economic con-

ditions, are capable of some profitable development and use in some industry of the state. As a handbook of useful knowledge concerning the mineral resources and industry of California, Bulletin 156 should serve a very broad field of interest. Explorer, producer, and user of mineral materials, together with the general public seeking authoritative information, should welcome this volume.

PROCEDURES FOR TESTING SOILS. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 418 pp. $3.75.

This extensive compilation of standards and suggested methods for soil and soil mixtures resulted from the cooperation of many leading authorities in this field. Sponsored by Committee D-18, the publication presents up-to-date information that should be of interest to everyone concerned with soils and every type of structure or project influenced by the type of soil. The soil-test procedures fall into five categories as follows: (1) explorations and samplings, (2) physical characteristics and identification, (3) physical and structural properties, (4) special and construction control tests, and (5) bearing tests in place and dynamic properties.

GAS PRODUCERS AND BLAST FURNACES. By William Gumz. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 316 pp. $7.

This book pays particular attention to the development of theory and calculation methods of gasification processes. It presents a unique, straightforward calculation method for blast furnaces. Readers who are not interested in making calculations themselves will profit from a better understanding of what is taking place in a gas producer or in a blast furnace. New proposals requiring expensive experimental work can be boiled down to optimum operation conditions before experimental work begins and can be concentrated on the more important and specific practical problems.

OIL AND GAS FIELD DEVELOPMENT IN UNITED STATES YEAR BOOK, 1950 (Review of 1949), Vol. 20. Published by the National Oil Scouts and Landmen's Association, Box 1095, Austin, Tex., 932 pp. with tables, charts, maps, geological columns, diagrams, and plates. $7.50.

This book is designed for oil men who want a handy reference for last year's geological and geophysical prospecting, land and leasing activities, wildcat exploration, proven field development, oil and gas production, and pipe-line and refinery statistics. The volume covers all states except Minnesota, Wisconsin, Iowa, Missouri, Nevada, Oregon, Washington, and the six New England States, none of which had sufficient oil activity during 1949 to belong in this review. The ever-widening scope of this annual report is evidenced by the inclusion of a chapter on Colombia in South America. The wealth of data in this book is not presented in a set pattern, but rather in a variable form that brings out the highlights of any given state or region. The volume begins with Frederic H. Lahee's "Exploratory Drilling in 1949," which summarizes exploratory wells by various classifications so that historical comparisons have true significance. Following is M. G. Langhorne's "Supply, Demand, and Transportation of Crude Oil in United States," a brief but complete review of last year's oil distribution. These two introductory chapters are followed by the association's own reports by states. The reports by states begin the highlights of the past year's activity summarized in short paragraphs. These are followed by tabulations of the important oil fields showing production records, and both geological and engineering data. Also tabulated are records and summarizing statistics on exploratory wells (discoveries, new pays, important extensions, and dry holes), proven field development, blocks assembled and general leasing activity, geophysical and core-drill prospecting activity, gas and oil production, production outlets, pipe-line construction, recycling and repressuring plants, and refineries. Geological cross-sections, columnar sections, maps, and correlation tables are used extensively in this volume, and there are many maps of the states and portions of states showing oil and gas fields.

PROCEEDINGS OF THE UNITED NATIONS SCIENTIFIC CONFERENCE ON THE CONSERVATION AND UTILIZATION OF RESOURCES. VOL. 1, PLENARY MEETINGS 1950. Published by Columbia University Press, 2960 Broadway, New York. 431 pp. $4.50.

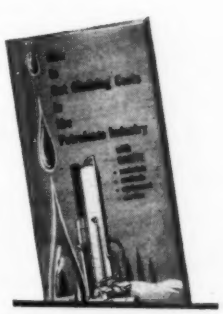
This is the first volume of the proceedings of the conference which brought together over 700 scientists from 50 countries to consider more than 500 scientific papers. With the publication of these proceedings, the ideas and the knowledge presented at Lake Success, in August and September 1949, will be made available throughout the world.

FIRST REPORT ON COORDINATION OF OIL REFINERY EXPANSION IN THE OEEC COUNTRIES. Report by the Oil Committee on the long-term plans of the participating countries. Published by Columbia University Press, 2960 Broadway, New York. 87 pp. $1.25.

This volume is divided into a general report of seven chapters and a second part containing a report by countries. It is the culmination of an agreement on the part of the council to instruct the oil committee to examine the long-time refinery-expansion plans of the participating companies and to draw up a coordinated program of refinery building and expansion in western Europe.

HEAT EXCHANGERS

cleaned chemically cuts out-of-service time



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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Vanadium in Crude Oils—1-Occurrence

1. Would you advise through The Oil and Gas Journal what effect the vanadium content of Bunker C has on combustion, corrosion, or deposition of the residue when used for firing boilers and furnaces?—R. A. P.

2. We are interested in obtaining the following information regarding the presence of vanadium in fuel oils used for firing boilers.

(a) Has the oil residue containing vanadium any deleterious effect on the steelwork or refractories?

(b) If so, what is the maximum amount of vanadium tolerable?

(c) How can vanadium be best detected in fuel oils?

(d) How can it be best eliminated? C. E. B.

3. We would be obliged if you can offer any information on the alleged deleterious effect of vanadium salts in fuel oil upon either high-nickel or 18-8 furnace tubes operating at a tube metal temperature of 1,400° F. Recently we lost a set of high-nickel steam superheater tubes and it has been suggested that the failure was due to, or accelerated by, the vanadium salts in the Bunker C fuel oil.—H. R. E.

This flurry of questions indicates that vanadium in fuel oil must be contributory to damaging effects although an investigation fails to reveal any very definite information on these phenomena. However, the Journal will publish in several issues, everything available.

The presence of the metal vanadium in crude oils, bitumens, and coal is common. It is found in the ash and is usually reported as vanadium pentoxide (V_2O_5) but some contend that vanadium trioxide (V_2O_3) is the proper combination. The trioxide melts at 1970° C. (3578° F.) and pentoxide at 690° C. (1,274° F.).

Vanadium pentoxide definitely reduces the fusion point of china clay:[1]

Per cent V_2O_5	Fusion point °C.
0	1770
1	1750
5	1730
10	1710
20	1670
40	1435
60	1180
80	940
100	675

Combined with oxygen, the vanadium can appear as vanadates of metals.

The coals found in southwestern United States are relatively rich in vanadium, and black shales or organic muds nearly always show some vanadium. It is strongly suspected that vanadium finds its way into coal or oil from the animal or plant life from which these deposits are derived. Just as the iron in the blood of most animals is in part replaced by copper in the case of oysters and by zinc in other animal life, vanadium is supposed to have replaced iron at least in part in the bodies of certain sea urchins. Likewise, in certain plant life, notably in those that have existed in the Carolinas, the ordinary chemical structure of chlorophyll which contains magnesium is thought to be replaced by other similar compounds in which vanadium is the metal part of the molecule. San Rafael petroleum in Argentina was found[2] to contain 0.0377 per cent ash of which 11.9 per cent was vanadium pentoxide. This corresponds to 0.0045 per cent in the petroleum. Lignite from the same locality contained 53 times more vanadium than the petroleum. Fester and Cruellas[3] concluded that the vanadium in San Rafael petroleum was somewhat proportional to the bituminous content and was not related to other organic materials. They suggested that vanadium was precipitated along with iron and nickel from aqueous solution by means of hydrogen sulfide produced by bacterial decomposition of the organic deposits. Oils from Sierra Lotena and Commodoro Rivadavia (Argentina) contain[5] only 0.00032 and 0.00025 per cent of vanadium anhydride, respectively.

Longobardi[3] also finds that vanadium and nickel are somewhat directly related to the content of asphaltenes and of sulfur. Nickel seems to be present in small amount in nearly all petroleums,[4] and vanadium in asphaltic oils. Thomas[6] also reports vanadium in oils from Persia, Mexico, and Egypt and presents numerous analyses of ash.

Vanadium is a catalyst in the oxidation of sulfur dioxide into sulfur trioxide. Thus, vanadium in high-sulfur flue gases is thought by some to promote the formation of sulfur trioxide, and at lower temperatures in the presence of moisture, sulfuric acid. Thus, in air preheaters where the gas temperature is reduced to 300° F. or lower and metal temperatures may be as low as 150° to 175° F., sulfur trioxide will combine with moisture causing dust or solid particles to adhere to surface. This may cause plugging of passageways and corrosion due to saturation of the deposit with dilute sulfuric acid.

Vanadium has been reported in the petroleum materials of at least the following localities: California, Wyoming, Texas, Nevada, Kansas, Oklahoma, Hungary, Colombia, many fields in Venezuela, Argentina, Mexico, Persia, Russia, and Egypt. This wide occurrence of vanadium leads to the belief that the amount of ash and the richness in vanadium must be more important than the mere presence of vanadium.

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1. Kallauner and Hruda, reported in Mellor's Inorganic and Theoretical Chemistry, Vol. IX.
2. Longobardi, E., "The Mineral Content of Petroleum," Anales. Soc. Scient. Argentina, Vol. 117, p. 5 (1934) and J. Inst. Pet. Tech., Vol. 21, p. 132, 127A (1935).
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4. Ramsey, J., "The Significance of Nickel in Petroleum," J. Inst. Pet. Tech., 10, 87 (1924).
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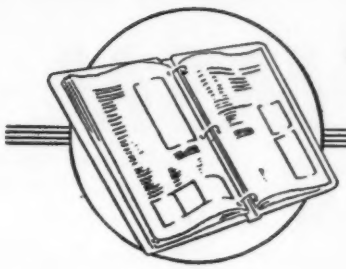
Miscibility of Alcohol-Gasoline Blends

In your Questions on Technology of March 30 it is stated that "agents can be added which assist in preventing the separation of an alcohol-water layer." We only know of benzol (benzene) or its homologs for this purpose. Are there other practical additives for preventing the formation of a water layer?—Dr. A.

Alcohol fuels are not used commercially to any extent in the United States and hence not much of a study of additives for the purpose of preventing the separation of a water layer in alcohol-gasoline fuels has been made. The best-known agents are benzol (benzene) and the aromatics, higher alcohols, and cyclohexanol. Ormandy and Craven (J. Inst. Pet. Tech., 9, page 36, 1923) found that these materials and also cresol, were more effective than other materials studied. Their effectiveness, however, was only one-tenth to one-fifth as much as the effect of water (in the alcohol).

Materials that have been suggested or perhaps used are: (See Nash and Howes, Principles of Motor Fuel Preparation . . ., Vol. 1, 2nd Ed., page 515, John Wiley & Sons, New York, 1938, or Ellis, C., Chemistry of Petroleum Derivatives, Vol. 2, page 1035, Reinhold Publishing Corp., 1937, New York):

benzol (benzene)
toluol (toluene)
hexahydronaphthalene
acetone
ethyl ether
n-butyl alcohol
isoamyl alcohol
isopropyl alcohol
ricinoleic acid
castor oil
alkyl formates
menthol
geraniol
citronellol
pine oil (steam distilled)
terpineol
fenchyl alcohol
borneol
camphor
carbon disulfide
triethyl amine
benzyl amine
piperidine



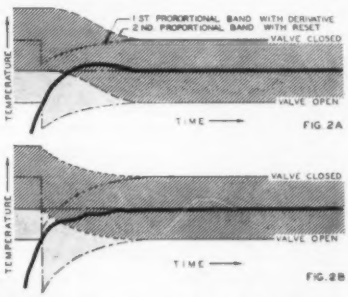
THE REFINER'S notebook

Tri-Act Control*

TO prevent overpeaking, it is essential that the proportional band must not shift above the control point during the start-up period, as illustrated in Fig. 3 (Installment No. 46) and Fig. 1 (Installment No. 47). Since this shifting of the band occurs each time that automatic reset is used in the circuit, let us separate the circuit and in the first half put only the proportional and the derivative responses. Since automatic reset is always necessary to prevent the offset due to load change, this will be incorporated in the second half of the circuit so that it will not disturb the proportional band of the first half. Of course, if the derivative and proportional responses are to be passed on to the diaphragm valve, the second half of the circuit must also have a proportional response. In short, we are suggesting a controller divided into two sections. The first incorporates proportional and derivative responses, and the second incorporates proportional and automatic reset responses. Since two proportional bands exist, this controller could be called a two-band controller, the first band being affected by the derivative response and the second being affected by the automatic reset response.

Fig. 1 illustrates a method of obtaining these results. Again, an increasing temperature in the process moves the baffle toward the nozzle. The increased nozzle back pressure in this case is connected directly to the left side of the bellows causing the nozzle to back away as the baffle approaches. By varying the mechanical linkage between the motion of the bellows and the nozzle, the sensitivity or proportional band of the controller can be adjusted. If a restriction is incorporated in the line leading to the bellows, the derivative function is added to this section of the controller in the customary fashion. If the output of the controller is fed to a relay which incorporates the proportional and automatic reset responses, the automatic reset feature can be added without shifting the band in the first portion of the circuit.

The startup characteristics of a controller of this type may be seen by reference to Fig. 2A. During the startup period, before the temperature reaches the bottom edge of the first proportional band, this band is divided by the control point. Since the derivative function is incorporated in this portion of the control circuit, the band shifts downward as soon as the temperature reaches its lower edge as illustrated in Fig. 2 (Installment No. 46). The position of the temperature within this band at any time is indicative of the output pressure of this half of the control system and it will be seen that very shortly after the temperature enters the control band the output pressure is more than 50 per cent of the way to its other extreme position. Since the output pressure from this portion of the control circuit is now connected to a relay incorporating the reset function, this relay is actuated as soon as the pressure reaches a given value, and the second control band begins to shift downward from its unfavorable position.



In other words, in the eyes of the reset relay, the temperature has apparently reached the control point at the time the output from the first half of the controller reaches the actuating value. Due to the derivative action, it is possible to make this output pressure reach the actuating value long before the rising temperature reaches the actual control point. In this interval the controller can, if properly adjusted, shift the second proportional band downward so that overpeaking is prevented. Actually, in Fig. 2 of this installment the derivative response was not great enough to shift the second proportional band rapidly enough to prevent overpeaking. In Fig. 2B the derivative response has been increased, the second proportional band shifts more quickly, and overpeaking is prevented.

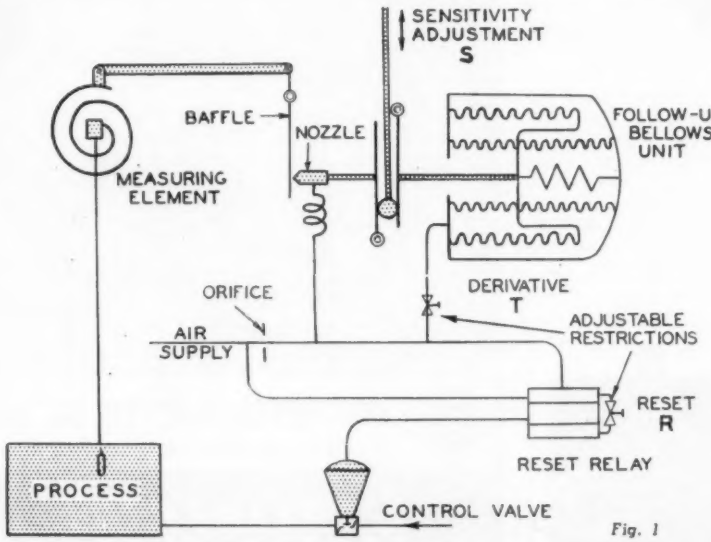


Fig. 1

*Portion of paper "Tri-Act Control—A New Concept," by R. E. Clarridge, Taylor Instrument Cos., presented at fifth annual instrument symposium, Texas A. & M. College.

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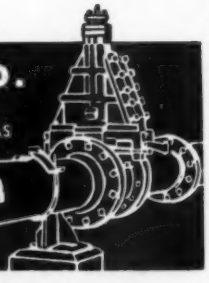

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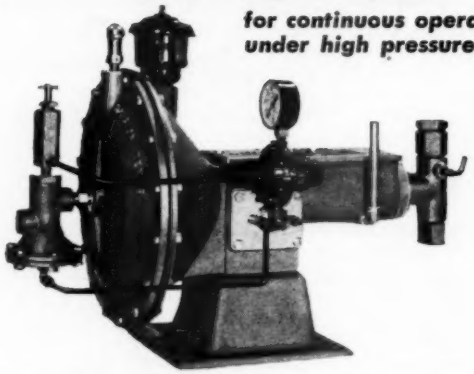

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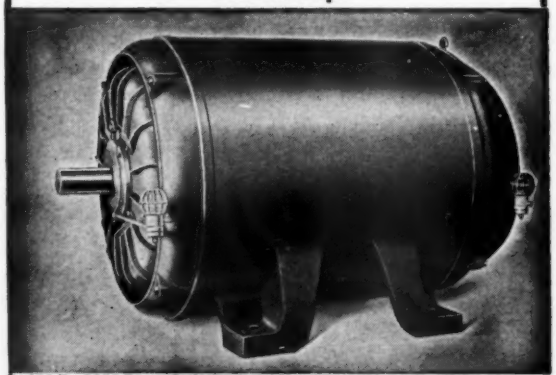

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Water Encroachment

THE value of water encroachment as a producing mechanism rests upon the degree to which it is recognized and utilized prior to the depletion of the reservoir by solution-gas drive. It is of consequence not only to be able to recognize the existence of possible water encroachment relatively early in the life of a field but also to be able to evaluate it quantitatively.

The material-balance equation is often suggested as one means of estimating a water drive. This equation is, for a reservoir without a gas cap (Engineering Fundamentals No. 334):

$$N(u - u_o) = \Delta N[u + (R_c - r_o)v] - (W - w) \qquad (1)$$

where (W — w) is the net water encroachment, written in this manner to distinguish between that which enters the boundaries of the reservoir as encroachment, W, and that which is produced, w. In the presence of a water drive, the original oil in place will calculate to be an ever-increasing quantity because of the manner in which reservoir pressure is supported by the water drive. Once this has been determined, it is necessary to find a value of original oil in place by some means other than the material-balance equation so that it can be used to solve for the water encroachment term in Equation 1.

The fallacy in this method is that an increasing apparent value of oil in place is not always due to water influx. Furthermore, it is not always possible to evaluate an independent value of oil in place to use in solving for the encroachment even when it is known that the latter exists. Woods and Muskat[1] have pointed out the dangers of using the material-balance equation for such purposes without supporting data.

The crux of the problem lies in either distinguishing some of the characteristics of water encroachment so that a proper use of the material balance can be made or in evaluating the magnitude of the water drive independently.

It may be possible in some instances to use the water-oil ratio of a well as a measure of the water saturation at that point. This would necessitate knowledge of a relative-permeability curve. When this saturation was determined for all wells producing water, a volumetric calculation would permit the evaluation of water influx.

The only other method of evaluating water influx is through basic characteristics, found either from a theoretical approach or from empirical observations. It has been observed that water influx as a function of time often proceeds in the same manner, especially when production is prorated. Fig. 1 shows the water influx as given for the Jones sand, Schuler field.[2] This relationship is typical. Others can be seen in the study by Bruce.[3]

From a theoretical standpoint the water influx into a reservoir is expressed partly by Darcy's law. The flow of water must be some function of the pressure gradient which is developed and of the permeability to water. Unfortunately for ease of analytical expression, the water influx is an unsteady state action. Not only does the pressure difference between the water zone and oil reservoir vary as the oil zone is depleted, but as water flow proceeds from the water zone, the pressure is continually drawn down, thus increasing the distance over which the pressure gradient is acting. Referring to Fig. 2, the pressure at water-oil boundary remains at its original value until sufficient withdrawal occurs to bring the drainage radius of the well to that position. As water flow proceeds, it first takes place because of the expansion of the water immediately adjacent to the oil zone. That back in the water zone at the point B cannot move until the pressure at point A has fallen to establish a gradient. The speed with which the pressure wave is felt back within the water zone depends upon the compressibility of the water as well as upon its mobility within the formation.

The analytical expression for treating water influx cannot, therefore, be simple, but it can be reasoned to be some function of the degree to which the reservoir pressure is depleted and the length of time that the encroachment is carried on. A general form for water influx is given as[1]:

$$W = c\,f(p,t) + a$$

where c and a are constants and the function of pressure and time can be approximated by one of several formulas. The unfortunate circumstance is that the constants c and a are not easily evaluated and usually necessitate the use of actual water influx data, such as Fig. 1, for their determination.

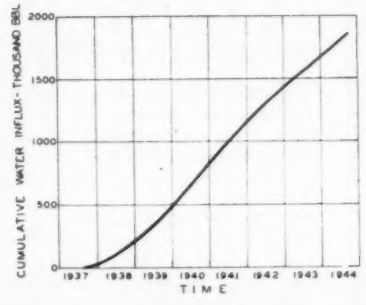

Fig. 1

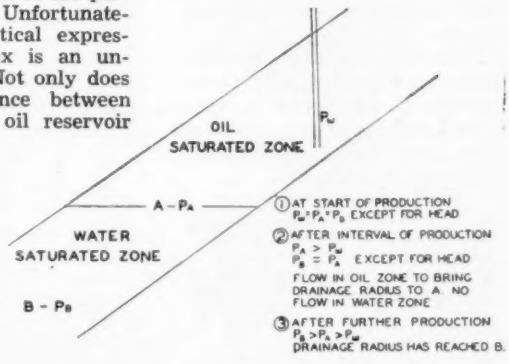
OIL SATURATED ZONE
P_w
A - P_A
WATER SATURATED ZONE
B - P_B
① AT START OF PRODUCTION $P_w = P_A = P_B$ EXCEPT FOR HEAD
② AFTER INTERVAL OF PRODUCTION $P_A > P_w$ $P_B = P_A$ EXCEPT FOR HEAD FLOW IN OIL ZONE TO BRING DRAINAGE RADIUS TO A. NO FLOW IN WATER ZONE
③ AFTER FURTHER PRODUCTION $P_B > P_A > P_w$ DRAINAGE RADIUS HAS REACHED B.

Fig. 2

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1. Woods and Muskat, An Analysis of Material Balance Calculations, A.I.M.E. Trans. 1945, Vol. 160.

2. Fancher, Secondary Recovery of Petroleum in Arkansas—A Survey, Arkansas Oil and Gas Commission.

3. Bruce, A Study of the Smackover Limestone Formation, A.I.M.E. Trans. 1944, Vol. 155.

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PIPE LINES

Buckeye Products Line

Buckeye Pipe Line Co. has preliminary plans under way looking toward the 1951 construction of a 400-mile products system to connect eastern seaboard refineries with Buffalo, N. Y. At Allentown, Pa., laterals from New Jersey and Philadelphia refinery areas would connect with a trunk line to extend from there to a Buffalo terminal.

Pipe is reported to be 8, 10, 12, and 14-in. in diameter. Floyd E. Warterfield, Jr., engineering consultant is said to be establishing a temporary office at Allentown.

Smith Discusses Controls

At the Pipe Liners Club of Tulsa meeting last week, S. S. Smith, manager of products pipe lines for Shell Oil Co., Inc., gave particular attention to problems of automatic and remote controls in his comprehensive discussion of a wide range of subjects relating to products pipe-line operation.

Automatic controls are now more effective than manual manipulation in the handling of all phases of pumping unit and valve operations at pipe-line stations, according to Smith. However, operators are established at all stations on Shell Oil Co.'s system for maintenance and emergency requirements.

Controls should function directly for definite practical purposes. He cited certain impractical control applications where controlling factors were only indirectly related to station functions. Controls should perform functions which an engineer observes directly in operating a station by hand.

As a result of the accurate measurements obtained with the use of meters, the delivery of batched shipments in the Shell Oil Co. system is handled on a reliable time basis. "Pipe-line time" is Central Standard Time on all systems operated by the New York dispatcher's office; these include the Wood River, Ill.-Chicago line, the Wood River-Columbus, Ohio, line, and the Massachusetts system from Fall River to West Boylston and Waltham system.

Lateral Lines Approved

WASHINGTON.—Lateral pipe lines costing approximately $1,200,000 will be constructed by Piedmont Natural Gas Co., Spartansburg, Va., under an initial decision of the Federal Power Commission. The six laterals will aggregate 73.7 miles, providing distribution service to natural-gas markets in North and South Carolina. The decision favored Piedmont over competing offers from Carolina Natural Gas Corp., Charlotte; and Public Service Co. of North Carolina, Inc., Gastonia.

Communities to be served by Piedmont are Charlotte, Winston-Salem, Greensboro, Salisbury, High Point, and Burlington, in North Carolina; and Greenville and Spartanburg in South Carolina.

To provide the necessary flow for the new system, Transcontinental Gas Pipe Corp., Houston, is authorized to increase its compressor-station capacity by 4,800 hp. during the first year, and by 40,875 hp. for the second year.

To prepare for the service Piedmont will acquire the distribution system and gas plants of the Duke Power Co.

Another River Span Asked

WASHINGTON.—Authority to construct a standby pipe line crossing the Mississippi River at Moline, Ill., has been asked of the Federal Power Commission by Iowa-Illinois Gas & Electric Co., Davenport, Iowa.

The project would include approximately 1.5 miles of 8-in. line spanning the river between Bettendorf, Iowa, and Moline. Approximately half of the pipe line would be carried on the suspension bridge across the river. Cost of the installation is estimated at $70,000.

The application said that the interconnection between the two districts would be used only intermittently to supply natural gas from one district to the other in emergencies, or whenever the supply from one district cannot be obtained over existing connection with the Natural Gas Pipeline Co. of America. Iowa - Illinois purchases all its natural-gas requirements from Natural Gas Pipeline.

Mississippi Lines O.K.'d

WASHINGTON.—Pipe lines for two distributing systems in Mississippi have been authorized by the Federal Power Commission, the combined cost being estimated at approximately $2,000,000.

North-central District will construct about 98.5 miles of pipe line from an outlet on Southern Natural Gas Co.'s system. The artery will service natural gas to the Mississippi towns of Ackerman, Mathiston, Eupora, Walthall, Maben, Mantee, Houston, Vardaman, Derma, Calhoun City, Pittsboro, and Bruce. In addition the

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District will construct distribution facilities in these communities.

The Carthage District will build approximately 16.5 miles of pipe line extending from Southern Natural's system in Mississippi to Carthage, Miss. The development will also include distribution facilities.

North Central plans to lease all its proposed facilities to Mississippi Gas Co. which will operate the entire system. Mississippi is a wholly owned subsidiary of Southern Natural.

The Carthage District plans to lease its proposed pipe-line facilities to Mississippi Power & Light Co.

The Districts are political subdivisions of the State of Mississippi, composed of various cities and towns seeking natural-gas service. Southern Natural is authorized by the commission to construct line taps and metering facilities adequate to serve the Districts.

Line Cost Sets Record

WASHINGTON. — Claude A. Williams, president of Transcontinental Gas Pipe Line Corp., testified before the Federal Power Commission that construction costs in New Jersey were exceeding all estimates.

Costs of main or lateral lines were running about $13.50 per foot, compared with about $5 per foot average over the rest of the system, he said. In the Paterson lateral where Transcontinental seeks the commission's authority to enlarge the diameter from 10¾-in. to 30-in., cost of right-of-way is running about $50 a rod. This compares with the system's over-all average of $6 per rod, Williams said.

Transcontinental asks permission to pull up parts of the smaller line already laid and replace them with the 30-in. artery. Installment of the larger pipe would cost approximately $800,000 more than original estimates.

Line Extension Planned

WASHINGTON.—Proposal of Niagara Mohawk Power Corp., Syracuse, N. Y., to build a 55-mile transmission system costing an estimated $1,991,000 will be considered by the Federal Power Commission in a hearing set for December 14. The commission will consolidate the Niagara Mohawk proposal with that of New York State Natural Gas Corp., New York City.

Niagara Mohawk would connect the projected pipe line with the New York State system at Therm City, N. Y. The carrier would extend to Watertown, touching intermediate markets at Mexico, Pulaski, Mannsville, Adams, Adams Center, Sandy Creek, and Lacona. Construction of the line would introduce natural-gas service into northeastern New York State.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Gulf Refining Co., Tulsa Pipe Line Division.—72 miles, 6-in., under way, El Dorado, Kans., to Webb City, Okla.; Pipeline Service Co., contractor. J. W. Welcher, Atlanta, Kans., spreadman.

Lakehead Pipe Line Co., Inc. (American subsidiary of Interprovincial Pipe Line Co., Canada).—321 miles, 18-in., contracted Neche, N. D., to Superior, Wis., to be completed October 1950; Anderson Bros., contractor.

Ohio Oil Co.—54 miles, 20-in., underway in Illinois; Betchel Corp., contractor; S. D. Betchel, Jr., superintendent.

Pan American Pipe Line Co.—80 miles, 10-in., under way, from southern part of Scurry County, Texas, to a connection with Humble pipe line near San Angelo, Tex.; Brown & Root, contractor.

Pelican Oil Co.—60 miles, 6-in., under way, Lake Charles to DeQuincy, La.

Phillips Pipe Line Co.—50 miles, 6-8-in., under way, Phillips tank farm, Sweeny, Tex., to Humble's Webster Station, Galveston County, Texas; O. R. Burden Construction Co., contractor; B. C. Barney Hall, spreadman.

Phillips Pipe Line Co.—25 miles, 8-in., considered, loops between Thrall and Kansas City, Kans.

Platte Pipe Line Co.—1,080 miles, 16-20-in., planned, Worland, Wyo., to Wood River refining area in Illinois.

Portland Pipe Line Co. (Montreal Pipe Line Co., Ltd.).—236 miles, 18-in., contracted, Portland, Me., to Montreal, Que., Canada.

Portland Pipe Line Co. (Montreal Pipe Line Co., Ltd.).—85 miles, 18-in., under way, Portland, Me., to Gorham, N. H.; Oklahoma Contracting Co., contractor of Section 1; H. A. Waylie, Westbrook, Me., superintendent.

Portland Pipe Line Co. (Montreal Pipe (Canada).—321 miles, 18-in., contracted, Gorham, N. H., to international boundary near N. Troy, Vt.; Associated Pipeline Contractors, Inc., contractor of Section 2. Lacy Walker, Barton, Vt., spreadman.

Portland Pipe Line Co. (Montreal Pipe Line Co.).—68 miles, 18-in., contracted, Canadian boundary to Montreal; Fred Mannix, contractor of Section 3.

Service Pipe Line Co.—25 miles, 8-in., under way, Beaver Creek and Riverton, Wyo.; Vaughn & Taylor Construction Co.

Shell Pipe Line Corp.—39 miles, 10-in., under way, McCamey to Kemper, Tex.; McVean & Roberts, contractor.

Texas-New Mexico Pipe Line Co.—16½ miles, 10-in., under way, Scurry County, Texas; O. R. Burden, contractor, Bill Price, spreadman.

West Coast Pipe Line Co.—20-in., planned, Permian basin, West Texas, to California.

Products Pipe Lines

Great Lakes Pipe Line Co.—39 miles, 12-in., under way, Hawarden, Iowa, to Sioux Falls, S. D.; Midwestern Constructors, Inc., contractor, R. C. Stanley, Canton, S. D.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City, Iowa, to Sioux Falls, S. D.

Phillips Petroleum Co.—281 miles, 10-in., proposed, Borger, Tex., to Yale, Okla.

Phillips Petroleum Co. and Shamrock Oil & Gas Co.—155 miles, 6-in., planned, extension on 600-mile line at Phillips, Tex., via La Junta, to Denver.

Plantation Pipe Line Co.—432 miles, 14-18-in., Baton Rouge to Bremen, Ga.—to Charlotte, N. C., Williams Brothers Co., contractor. Completion scheduled by end of 1951.

Pure Transportation Co.—100 miles, 6-in., proposed, Heath to Dayton, Ohio.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., under way, Boise, Idaho, to Pasco, Wash. Completion date, December 1950.

Salt Lake Pipe Line Co.—140 miles, 8-in., contracted Boise, to Baker, Idaho; Bechtel Corp., contractor.

Salt Lake Pipe Line Co.—Contracted. Macco Corp., and Morrison-Knudson Co., Inc.

Salt Lake Pipe Line Co.—120 miles, 6-8-in., under way, Baker, Ore., to Pasco, Wash. Completed August 8, 1950; Pacific Pipeline & Engineers, Ltd., contractor, L. E. Robertson, LaGrande, Ore., spreadman.

Standard Oil Co. (Ohio) and Shell Oil Co.—56 miles, 8-in., under way, Lima to Springfield, Ohio; Tulsa Construction Co., contractor.

Susquehanna Pipe Line Co.—126 miles, 8⅝-in., under way, Toledo, Ohio, to Sarnia, Ont., Canada; H. L. Gentry Construction Co., contractor. James Mitchell, Toledo, Ohio, spreadman.

Natural-Gas Pipe Lines

Acme Natural Gas Co.—25½ miles, 10-in., contracted, Ellwood to Butler, Pa., to be completed December 15, 1950; Williams-Austin Co., contractor. Howard Bauer, Butler, Pa., spreadman.

Alabama-Tennessee Natural Gas Co.—35 miles, 8-in., authorized, Muscle Shoals to Decatur, Ala.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Kentucky Natural Gas Co.—42 miles, 20-in., under way, North Means compressor station to Foster, Ky; completion date December 15, 1950; Williams-Austin Co., contractor, Leman Creech, Mt. Sterling, Ky., spreadman.

Chicago District Pipe Line Co.—41 miles, 24-in., authorized, loop Calumet pipe line—Joliet, Ill., to Chicago, completion date December 1950.

City of Indianapolis, Inc.—22 miles, 16-in., proposed, Indianapolis to Panhandle Eastern Corp. system.

Coast Counties Gas & Electric Co.—40 miles, 3-4-8-in., considered, coast and valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Commonwealth Natural Gas Corp.—84 miles, 12-in., contracted, Richmond to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Co.—20 miles, 8-in., contracted, James River to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—104 miles, 18-in., under way, Standardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—41 miles, 12-in., planned, Enid to Blackwell, Okla., Marlow to Cement, Okla.

East Ohio Gas Co.—24 miles, 20-in., authorized, northeastern Ohio to near Petersburg to East Ohio's Austintown station near Youngstown.

East Tennessee Natural Gas Co.—100 miles, planned, lateral to be laid in 1950.

East Tennessee Gas Corp.—150 miles, 16-in., under way, Knoxville to Bristol, Tenn.

East Tennessee Natural Gas Co.—398 miles, 3-16-in., planned, Nashville to Chattanooga to Knoxville, Tenn., and laterals.

East Tennessee Natural Gas Co.—106 miles, 12-16-in., contracted, Lobelville to Tulla-

homa, Tenn.; Oman Construction Co., contractor.

East Tennessee Natural Gas Co.—130 miles, 12-in., under way. Athens, via Chattanooga, to Tullahoma, Tenn.; N. A. Saigh Co., Inc.

East Tennessee Natural Gas Co.—120 miles, 12-in., planned, Chattanooga to Knoxville, Tenn.; Walters & Saigh Construction Co.

East Tennessee Natural Gas Co.—185 miles, 16-in., planned, Lobelville to Chattanooga, Tenn., Walters & Saigh Construction Co.

Eastern Natural Gas Corp.—292 miles, 24-in., proposed, Phoenixville, Pa., via New Haven and Hartford, Conn., Providence, R. I., Springfield, Mass., and Boston.

Egyptian Natural Gas Co.—80 miles, 6-8-in., planned, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—352 miles, 30-in., under way, looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif., to be completed November 1950.

El Paso Natural Gas Co.—450 miles, 24-in., authorized, San Juan basin, New Mexico, to Franconia, Ariz., to be completed November 1951 by company crews.

Home Gas Co.—70 miles, planned, Orange, Sullivan, Rockland, and Cattaraugus counties, New York.

Humble Oil & Refining Co.—50 miles, 8-in.; Trawick field to near Longview, Tex.; Trojan Construction Co., contractor.

Jersey Central Power & Light Co.—39 miles, 10-in., planned, New Jersey coast system of Texas Eastern Transmission Co.'s Big Inch.

Lion Oil Co.—60 miles, 6-2-in., gas gathering system in Scurry County, Texas. George Tucker Pipe Line Construction Co., contractor. J. O. Carter, spreadman.

Magnolia Petroleum Co.—60 miles, 4-24-in., gathering system in LaWard and Lolita fields, Texas; Henry L. Lemons & Co., contractor. W. A. Remington, spreadman.

Michigan Gas Storage Co.—150 miles, 20-in., planned, Chelsea terminal-Winterfield and Cranberry Lake, Mich.; Mahoney Contracting Co., contractor.

Michigan-Wisconsin Pipe Line Co.—197 miles, 6-18-in., under way, Milwaukee to Green Bay and Two Rivers, Wis.; G. G. Griffis Construction Co., contractor. F. K. Egan, Fond du Lac, Wis.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—335 miles, 12¾-in., under way, Worland, Wyo., to Baker, Mont.; R. A. Conyes Construction Corp., contractor. Al Poggi, Hardin, Mont., superintendent.

New York State Natural Gas Corp.—42 miles, 20-in., Ohio-Pennsylvania line to Bakerstown, Pa.; Tulsa-Williams Co., contractor. O. L. Martin, Darlington, Pa., spreadman.

New York State Natural Gas Corp.—21 miles, 20-in., under way, Tonkin station to Bakerstown, Pa., to be completed December 1, 1950; Williams-Austin Co., contractor. Ralph Gaddy, New Kensington, Pa., spreadman.

New York State Natural.—164 miles, 16-in., planned, Ithaca to Albany, N. Y.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

Niagara Mohawk Power Corp.—35½ miles, 10-14-in., under way, Therm station, to Fulton, N. Y.; Williams-Austin Co., contractor. Howard Bauer, Nedrow, N. Y., spreadman.

Northern Natural Gas Co.—597 miles, 20-26-in., contracted, ten loops from Texas to northern Iowa.

Northern Natural Gas Co.—76 miles, 4 to 12-in., under way, gathering line in vicinity of Hugoton, Kans., Cheek Construction Co., contractor, Troy Cheek, Ulysses, Kans., superintendent.

Northern Natural Gas Co.—111 miles, 24-in., under way, Ogden, Iowa, to St. Paul, Minn.; R. B. Potashnick, contractor.

Northern Natural Gas Co.—75 miles, 26-in., under way, north of Beaver, Okla.; R. H Fulton & Co., contractor of Loop 2. Merele Lewellen, Mead, Kans., spreadman.

Northern Natural Gas Co.—33 miles, 26-in., contracted, Mullinville, Kans., station; R. H. Fulton & Co., contractor of Loop 3.

Northern Natural Gas Co.—72½ miles, 26-in., under way, Bushton to Minneapolis, Kans.; R. H. Fulton & Co., contractor of Loop 4. M. L. Boyd, Salina, Kans., spreadman.

Northern Natural Gas Co.—155 miles, 20-in., contracted, Garden City to Bushton, Kans.; R. H. Fulton & Co., contractor of Loop 5. Jerry Nash, Garden City, Kans., spreadman.

Northern Natural Gas Co.—43 miles, 26-in., under way, Palmyra, Neb., station to Oakland, Iowa, station; Midwestern Construction Co., Inc., contractor of Loop 6. M. T. Wilhite, superintendent.

Northern Natural Gas Co.—31 miles, 26-in., under way, north of Ogden, Iowa; R. B. Potashnick Co., contractor of Loop 8. H. F. Carr, Ventura, Iowa, spreadman.

Northern Natural Gas Co.—41 miles, 26-in., contracted, northward from Ventura, Iowa, station; R. B. Potashnick Co., contractor of Loop 9.

Northern Natural Gas Co.—40 miles, 26-in., contracted, Ventura, Iowa, station; R. B. Potashnick, contractor of Loop 10.

Northern Natural Gas Co.—222 miles, 26-in., under way, Borger, Tex., to Nebraska line; R. H. Fulton & Co., contractor. M. C. Boyd, Ashland, Kans., spreadman.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

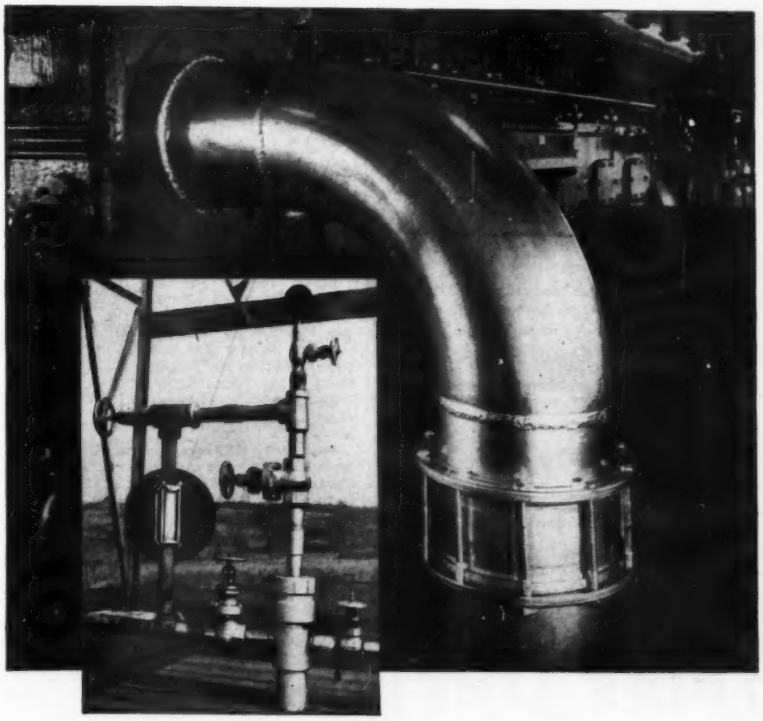
Ohio Fuel Gas Co.—22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salinas to Kilig City, Calif.

Pacific Lighting Corp.—23 miles, 30-in., planned, Inglewood to Encino, Calif.

Pacific Lighting Corp.—41 miles, 30-in., planned, Puente to March Field, California, to be completed 1950.

Pacific Northwest Pipe Line Co.—400



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miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Pipe Line Corp.—2,175 miles, 26-in., authorized, Texas Gulf Coast to Pacific Northwest.

Panhandle Eastern Pipe Line Co.—356 miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Phillips Petroleum Co.—99 miles, 3-16-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex.

Piedmont Natural Gas Co.—1,350 miles, 20-in., planned, Greenville, Miss., to Carolinas.

Plains Natural Gas Co.—120 miles, 4-24-in., contracted, Oklahoma-Kansas area, Hugoton field, gathering system; Midwestern Constructors, Inc., (Arey-Phillips Construction Co.) contractor. T. S. Nunley, Liberal, Kans., chief inspector.

Potomac Gas Co.—18 miles, 16-in., planned, Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized between Chillum and Rockville, Md.

Roanoke Pipe Line Co.—30 miles, 8-in., authorized, Gala, Va., to Roanoke.

San Diego Gas & Electric Co.—53 miles, 16-in., planned, San Diego County, California.

San Diego Gas & Electric Corp. (Southern Counties Gas Co.)—85 miles, authorized, San Diego, Riverside, and Moreno, California.

South Central Alabama Natural Gas Co., Inc.—150 miles, proposed, central Alabama.

South Georgia Natural Gas Co.—248 miles, planned.

South Jersey Gas Co.—75 miles, 10-12-14-in., under way, Pleasantville, N. J., to Bustleton, Pa.; G. G. Griffis, Inc., contractor, Ray Abney, Millville, N. J., spreadman.

South Jersey Gas Co.—14-in., under way, Franklinville to Bridgeton, N. J.; G. G. Griffis, Inc., contractor.

Southwestern Michigan Gas Co.—55 miles, 12¾-in., proposed, Oakland County to Marysville, Mich.

Southern California Gas Co.—83 miles, 30-in., under way, Whitewater, Riverside County, to Puente, Los Angeles County, California; Midwestern Constructors, joint contract with Johnson Western Gunite—L. E. Dixon. John Work, Banning, Calif., superintendent.

Southern Counties Gas Co. of California.—81 miles, 20-in., authorized, looping.

Southern Natural Gas Co.—32 miles, 16-in., under way, Wetumpka to Tallassee Ala.; completion due December 1; Sheehan Pipe Line Construction Co., contractor, C. M. Brown, spreadman.

Southern Natural Gas Co.—180 miles, 18-in., under way, Gwinville, Miss., to Selma, Ala.; Sheehan Pipe Line Construction Co., contractor. Jim Brown, Meridian, Miss., spreadman.

Southern Natural Gas Co.—24 miles, 24-in., under way, loops to Mississippi, Alabama, Georgia; Sheehan Pipe Line Construction Co., contractor. Jim Brown, R. H. Brown, spreadmen.

Southern Natural Gas Co.—85 miles, 18-in., under way, Mississippi-Alabama state line to Selma, Ala.; completion due November 15; Sheehan Pipe Line Co., contractor C. M. Brown, spreadman.

Southern Natural Gas Co.—161 miles, 16-18-in., under way, Selma, Ala., to Elmore Ala. Associated Pipeline Contractors, Inc. contractor. Lacy Walker and L. H. Gray spreadmen.

Southern Natural Gas Co.—110 miles, 11 in., considered, extension.

Southern Natural Gas Co.—118 miles, 13 in., planned, extension.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—171 miles, 16 planned, extension.

Southern Natural Gas Co.—225 miles, 16 in., planned, Colfax, Ga., extension.

Southern Natural Gas Co.—314 miles, 18 in., planned, extension.

Southern Natural Gas Co.—375 miles, 24

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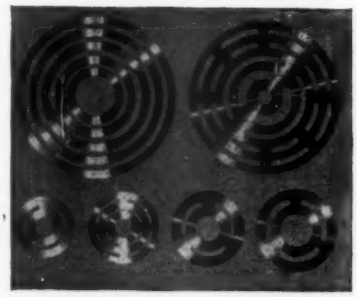

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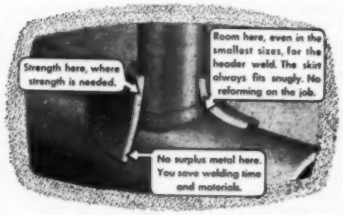
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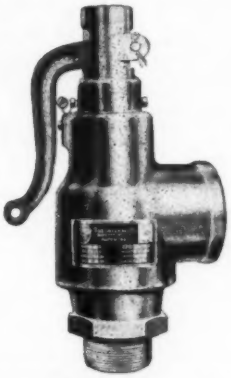

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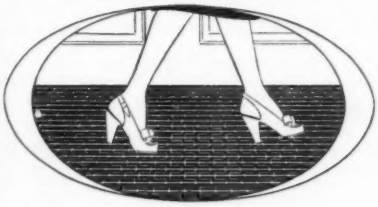

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in., planned, Gwinville, Miss., to Atlanta Ga.

Southern Union Gas Co.—78 miles, 8-10 14-in., planned, New Mexico loops and laterals.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—102 miles 16-in., under way, Bayou Sale to Kinder La.; Latex Construction Co., contractor H. L. Leake, superintendent.

Tennessee Gas Transmission Co.—700 miles, 20-26-in., planned, Burnaugh, Ky., to Massachusetts including 400-mile line to Buffalo.

Tennessee Gas Transmission Co.—95 miles, 20-in., under way, Natchitoches to Kinder, La.; Latex Construction Co., contractor. F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—70 miles, 26-30 in., contracted, between Stations 104 and 110; Anderson Brothers Corp., contractor. E. C. McCoy and Arkie Hobson, Richmond, Ky., spreadmen.

Tennessee Gas Transmission Co.—174 miles, 30-in., under way, western Tennessee and Kentucky; Price-Morrison, contractor. Jack Hodges and R. L. McMillon, superintendents.

Tennessee Gas Transmission Co.—74 miles, 30-in., under way, from near Glasgow northeastward to near Lebanon, Ky; Morrison Construction Co., contractor. R. L. McMillon, Adamsville, Tenn., spreadman.

Tennessee Gas Transmission Co.—28 miles, 30-in., under way, near Scottsville, southwestward to near White House, Tenn.; Morrison Construction Co., contractor. R. L. McMillon, Adamsville, Tenn., spreadman.

Tennessee Gas Transmission Co.—99 miles, 30-in., under way, near Dickson, southwestward to near Selmer, Tenn.; H. C. Price, contractor. Jack Hodges, Linden, Tenn., spreadman.

Tennessee Gas Transmission Co.—170 miles, 26-30-in., contracted, Kentucky; Anderson Brothers Corp., contractor.

Texas Eastern Transmission Corp.—1,400 miles, 26-in., planned, Texas to Pittsburgh, loops.

Texas Gas Transmission Corp.—33 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—723 miles, 26-in., under way, Lisbon, La., to Middletown, Ohio.

Texas-Illinois Natural Gas Pipeline Co.—53 miles, 20-in., lateral from Joliet terminal to connection with Natural Gas Pipeline Co. of America near Volo, Ill.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 26-in., La Gloria to Refugio, Tex.; Midwestern Constructors, Inc., contractor of Schedule 1. M. T. Wilhite, superintendent.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11. R. C. Stanley, superintendent.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., to start in 1951, Effingham to Sibley, Ill.; Midwestern Constructors, Inc., contractor to Schedule 12.

Texas-Illinois Natural Gas Pipeline Co.—93 miles, 30-in., to start in 1951; Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13.

Texas-Illinois Gas Pipe Line Corp.—409 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent.

Texas-Illinois Gas Pipe Line Corp.—126 miles, 30-in., contracted; H. C. Price, contractor. Work under way.

Texas-Illinois Gas Pipe Line Corp.—113 miles, 30-in., contracted; H. C. Price, contractor. Work under way.

Texas-Illinois Gas Pipe Line Corp.—97 miles, 26-in., contracted; H. C. Price, contractor. Work under way.

Texas-Illinois Gas Pipe Line Corp.—36

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miles, 24-in., contracted; H. C. Price, contractor. Work under way.

Texas-Illinois Gas Pipe Line Corp.—38 miles, 12-in., contracted; H. C. Price, contractor. Work under way.

Transcontinental Gas Pipe Line Corp.—1,840 miles, 30-in., under way, Rio Grande Valley, Texas, to New York City.

Transcontinental Gas Pipe Line Corp.—80 miles, 10-14-in., underway, Mercedes to south of Falfurrias, Tex.; Massey Construction Co., contractor of Schedule A.

Transcontinental Gas Pipe Line Corp.—106 miles, 24-in., under way, south af Falfurrias to Edna, Tex.; H. B. Zachry Co., contractor of Schedule B.

Transcontinental Gas Pipe Line Corp.—93 miles, 30-in., under way, Porters to Deweyville, Tex.; Texas Southern Contracting Co., contractor of Schedule D. Merle Tatum, Liberty, Tex., spreadman.

Transcontinental Gas Pipe Line Corp.—81 miles, 30-in., under way, Sabine River, to Eunice, La.; Anderson Bros. Corp., contractor of Schedule E.

Transcontinental Gas Pipe Line Corp.—100 miles, 30-in., under way, Catawba River, North Carolina, to North Carolina-Virginia boundary; R. H. Fulton & Co., contractor of Section 9. A. A. Corrigan and Clark Williams, superintendents.

Transcontinental Gas Pipe Line Corp.—86 miles, 30-in., under way, North Carolina-Virginia boundary to James River, Virginia; O. R. Smith Contracting Corp., contractor of Section 10. R. M. Jones, Altavista, Va., spreadman.

Transcontinental Gas Pipe Line Corp.—110 miles, 30-in., under way, James River, Virginia, to Potomac River, Virginia; O. R. Smith Contracting Corp., contractor of Section 11. C. C. Craig, Herndon, Va., spreadman.

Transcontinental Gas Pipe Line Corp.—75 miles, 30-in., contracted, Potomac River to Susquehanna River; Associated Pipe Line Contracting, Inc., contractor of Section 12. Cecil Rogers, Towson, Md., spreadman.

Transcontinental Gas Pipe Line Corp.—90 miles, 30-in., contracted, Susquehanna, Pa., to Delaware River; Wunderlich & Griffis Construction Co., contractor of Section 13.

Transcontinental Gas Pipe Line Corp.—61 miles, 30-in., contracted, Delaware River to Hackensack River, New Jersey; Wunderlich & Griffis Construction Co., contractor of Section 14.

Transcontinental Gas Pipe Line Corp.—23 miles, 30-in., under way, Edgewater to Elizabeth, N. J.; Oklahoma Contracting Co., contractor to Schedule 15. Louis Visentine, Edgewater, N. J., superintendent.

Transcontinental Gas Pipe Line Corp.—91 miles, 6-14-in., under way, Wharton, Tex., area; Altgelt Construction Co., contractor, Texas Unit 1.

Transcontinental Gas Pipe Line Corp.—58 miles, 4-14-in., under way, El Campo, Tex., area; T & R Construction Co., contractor, Texas Unit 1.

Transcontinental Gas Pipe Line Corp.—38 miles, 4-8-in., under way, Sinton, Tex., area; Shanks & Eustace, Inc., contractor, Texas Unit 2.

Transcontinental Gas Pipe Line Corp.—61 miles, 6-10-in., under way, Dix, Tex., area; Victoria Oil Field Maintenance Co., contractor, Texas Unit 2.

Transcontinental Gas Pipe Line Corp.—50 miles, 18-20-in., under way, Eunice, La., to the south; Texas Southern Contracting Co., contractor, Texas Unit 2. Jim Reed, Crowley, La., spreadman.

Transcontinental Gas Pipe Line Corp.—380 miles, 8-16-in., planned, laterals to gas field.

Transcontinental Gas Pipe Line Corp.—85 miles, 4-14-in., under way, South Louisiana; Latex Construction Co., contractor. J. B. Latham, Vinton, La., spreadman.

Transcontinental Gas Pipe Line Corp.—78 miles, 30-in., contracted, Delaware River to southwest; Ray L. Smith & Son, Inc., contractor. Joe L. Work, Newton, Pa., spreadman.

Trunkline Gas Co.—278 miles, 20-in., contracted, Valley of Texas; R. H. Fulton & Co., contractor.

Trunkline Gas Co.—18 miles, 26-in., contracted, Mississippi, Tennessee, and Kentucky; R. H. Fulton & Co., contractor.

Trunkline Gas Supply Co.—1,775 miles, 10-26-in., planned, includes 740-mile, 26-in., Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Supply Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to **Senatobia, Miss.**; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Supply Co.—184 miles, 26-in., under way, Senatobia, Miss., to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Ed Veach, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D, main line.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

Trunkline Gas Supply Co.—71 miles, 20-16-10-in., contracted, Longville, La., south; Houston Contracting Co., contractor of Section 1, lateral line.

United Gas Pipe Line Co.—51 miles, 12¾-in., proposed, Soso and Sherron fields, to near Meridian, Miss.

United Gas Pipe Line Co.—23 miles, 16-in., proposed, Mud Lake field, La., to near Port Arthur, Tex.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., proposed, fields in Plaquemines Parish to near New Orleans.

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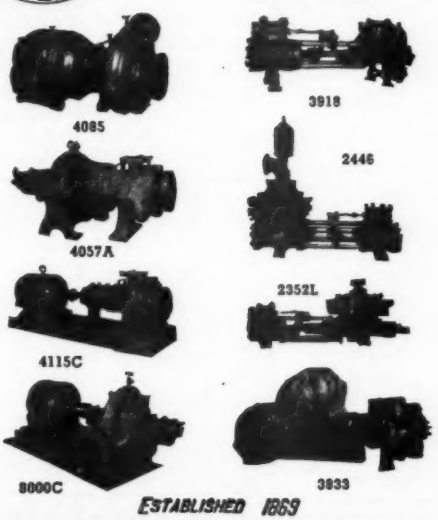

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Among the Drilling Contractors

Active Rigs Increase To New Record "High"

Another increase in the number of rotary rigs operating in the United States and western Canada during the week ended November 20 (latest report) boosted the total to a new all-time record. Active rigs during the week totaled 2,515, which was 16 more than the previous peak reported during the preceding week. Of the total 2,393 rigs were in the United States. This also was a new all-time high for that region. There were 122 rigs reported running in western Canada, a gain of 14 during the week. Decreases, which were slight, were reported only in the Gulf Coast and Rocky Mountain areas.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 11-20-50	Change week ended 11-13-50	Change week ended 11-21-49
Gulf Coast	574	— 9	+ 40
W. Tex.-N. M.	809	+ 9	+130
Ark.-N. La.-E. Tex.	159	0	— 3
Oklahoma	286	+ 3	+ 29
Kansas-Nebraska	158	0	+ 33
Illinois-Eastern	144	+ 3	+ 3
Rocky Mountains	129	— 4	+ 17
Pacific Coast	134	0	— 10
Total U. S.	2,393	+ 2	+239
Western Canada	122	+ 4	+ 17
Total	2,515	+16	+276

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the California and Illinois-Eastern areas are shown by charts on pages 118 and 119.

McCullough Drilling Co., Abilene, Tex., contractor on Rowan & Hope's new Canyon sand discovery well (1 City of Sweetwater) in central Nolan County, Texas, is skidding its rotary rig from that well to a north offset location to be drilled for the same operators.

Coats & Hearrell Drilling Co., Gladewater, Tex., is taking over the rotary drilling of a wildcat test being spudded by A. O. Phillips at 1 Snell, James McAdams Survey, 2 miles southwest of Quinlan, Hood County, Texas. Contract is for 4,600 ft. to test the Paluxy.

Portable Drilling Corp., Tulsa, has the contract for a 6,400-ft. test to be drilled for L. J. Horwitz of Oklahoma City in the area about 5 miles west of Tribley, Cleveland County, Oklahoma. The projected test will explore the Wilcox sand. Location, in the NW NW NE 1-7n-1e, on the Sokes lease, is 3½ miles from nearest production.

R-H-K Drilling Co., Abilene, Tex., has a rig running for Roark, Hooker & Hill at 2 Williams, in the Old Glory area, 8 miles northeast of Aspermont, Stonewall County, Texas. Location is in Section 6-C, AB&M Survey. Contract is for 6,500 ft.

Sterling Drilling Co., Sterling, Kans., has a rig running for J. J. Lynn at 1 Koester, a wildcat test in the SW SE NE 28-17-12, 2½ miles northeast of the newly opened Redwing pool, in northeastern Barton County, Kansas.

Fleet Drilling Co. Ada, Okla.-Dallas

AN outgrowth of recent amendments in the corporation charter of the Fleet Drilling & Producing Co. to divorce that company's production operations from its drilling activities, Fleet Drilling Co. is an organization with one business aim—that of contract drilling.

History.—Lineage of the company is traceable to 1930 when John J. Fleet, principal owner and president, started his first contract drilling enterprise. This enterprise was in Oklahoma where Fleet operated two steam rigs. Two additional steam rigs were placed in operation in 1933 and drilling and production activities extended into East Texas. Since then, these activities have been greatly expanded and have spread over various other areas in Texas and Oklahoma.

JOHN J. FLEET

Present equipment. — The company currently is operating 17 rotary rigs in Oklahoma and Texas. These include two heavy-duty, nine medium-heavy, and six medium-duty assem-

blies. It has 10 oil-field trucks. A large equipment yard and repair shop are maintained at Ada, and a machine shop and motor repair depot at Oklahoma City.

Management.—Executive headquarters are maintained both at Ada, Okla., and Dallas. John J. Fleet, president and principal owner, resides at Dallas with offices in the Wilson Building. J. D. Macdonald, executive vice president and treasurer, has his offices in the First National Bank Building, Ada. Others in the Ada office include: Richard Minton, assistant to the executive vice president; I. R. Minton, vice president in charge of sales and customer relations; E. C. McPherson, vice president in charge of field operations; F. X. Schrameck, assistant secretary - treasurer; Grace Walker, secretary; and L. H. Harrell, counsel and director. Dr. Carl W. Fleet is vice president for South Texas.

Key operators. — Toolpushers are: Henry Hankins, Ardmore district; J. T. Hurt, Healdton district; O. D. Spurgin, Oklahoma City district; John Tahsuda, Duncan district; Bob Claiborn, Pauls Valley district; Overton Whately, Lindsay district; Sid Jones, Ada district. Floyd New is chief mechanic; Hubert Mullen, truck superintendent; and William Boone, yard foreman and welder.

Kingerly Drilling Co., St. Jo, Tex., has contracted with Woodley Petroleum Co. for a 5,000-ft. Ellenburger test to be drilled in the Sarah Blythe Survey, 1 mile south of Lusk, in southeastern Throckmorton County. Materials and equipment are being moved in. The test is 1 Raiza.

Longhorn Drilling Corp., of San Antonio and Three Rivers, Tex., has a contract from Shell Oil Co. and associates for an 8,500-ft. test to be drilled in the Clayton field, western Live Oak County, South Texas. The well is 1 Unit, Block 75, Simmons Subdivision. Drilling also is under way on an 8,000-ft. wildcat test in McMullen County which this company has contracted for Delhi Oil Corp. of Dallas. This well is 1 D. W. Rhode, Trustee, located 4 miles north of the Brazil townsite.

Summy Drilling Co. is the contractor on a wildcat test being drilled just north of Ballinger, in Runnels County, Texas, for J. B. Ashman and H. T. Hilliard of Midland, Tex. The well is 1 Routh.

Mid-West Drilling Co., Lubbock, Tex., is starting a contracted 11,000-ft. Pennsylvanian wildcat test in northeastern Yoakum County, West Texas, for Star Oil Co. The well is 1-A Taylor Heirs. Location is in Section 200, Block D, J. H. Gibson Survey. It is 5 miles west of the Alex field, and about 14 miles southeast of the Landon field.

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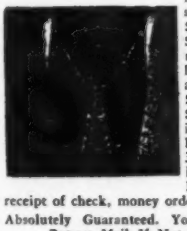

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NATURAL GAS

Gas Markets Specified

WASHINGTON.—Communities and distributing systems in New England have been specified by the Federal Power Commission in fixing the proposed service of natural gas by Northeastern Gas Transmission Co., and Algonquin Transmission Co.

Those which Northeastern is authorized to serve are: Connecticut Light & Power Co., in Winsted and Norwalk, Conn.; Connecticut Power Co., in Torrington and Stamford, Conn.; Greenwich Gas Co.; Bridgeport Gas Light Co., Derby Gas & Electric Co., Danbury and Bethel Gas & Electric Co., Wallingford Gas Co., New Britain Gas Light Co., Massachusetts-Pittsburgh Coal Gas Co., Springfield Gas Light Co., Holyoke Gas & Electric Department, Fitchburg Gas & Electric Co.; Northern Berkshire Gas Co., Northampton Gas Light Co., Worcester County Electric Co., Spencer Gas Co., Wachusett Electric Co., Leominster Gas Light Co., Athol Gas & Electric Co., Arlington Gas Light Co., Malden & Melrose Gas Light Co., Salem Gas Light Co., Beverly Gas & Electric Co., Gloucester Gas Light Co., Lawrence Gas & Electric Co.; Worcester Gas Light Co. and Haverhill Electric Co., all in Massachusetts. Those in New Hampshire are Manchester Gas Co., Concord Gas Co., and Gas Service, Inc.

Algonquin would be authorized to serve in Massachusetts Brockton Gas Light Co., Taunton Gas Light Co., Fall River Gas Works Co., Cambridge Gas Light Co., Dedham & Hyde Park Gas Co., New Bedford Gas & Edison Light Co., Plymouth Gas Light Co., Milford Gas Light Co., Boston Consolidated Gas Co., Old Colony Gas Co., Buzzards Bay Gas Co., and Norwood Gas Co.

In Rhode Island service would be to Blackstone Valley Gas & Electric Co.; Providence Gas Co., Newport Light Gas Co., Narragansett Electric Co., distributing in Westerly, Briston, and Warren. For Connecticut, service would be to Connecticut Power Co., in New London; Connecticut Power Co., in Waterbury, New Haven, Williamantic, and Putnam; New Haven Gas Light Co.; Mystic Power Co., Hartford Gas Co.; and Norwich Gas & Electric Department. In New Jersey, Algonquin would serve the Jersey Central Power & Light Co.

Pipe-Line Sale Asked

WASHINGTON. — Natural Gas Pipeline Co. of America has asked authority of the Federal Power Commission to acquire all the natural gas pipe-line facilities of Texoma Natural Gas Co. Both are Chicago companies and subsidiaries of People's Gas, Light & Coke Co.

The transmission facilities which Natural would acquire include two compressor stations in Hutchinson and Moore counties, Texas; a 74-mile, 24-in. pipe line from the Hutchinson County station to the inlet of Natural's system near Gray, Okla.; and a 70-mile, 26-in. pipe line extending from the Moore County station to the Gray inlet.

Natural is now Texhoma's only customer. A total of about 340 million cubic feet of natural gas are delivered daily.

Transco Decision Ordered

WASHINGTON.—Final decision has been ordered by the Federal Power Commission on plans of Transcontinental Gas Pipe Line Corp., Houston, to build 17 miles of pipe line from its main-transmission line in Bergen County, New Jersey, to the Paterson Gas Works of Public Service Electric & Gas Co., Paterson, N. J.

Nevada Line Proposed

WASHINGTON. — Nevada Natural Gas Pipeline Co., Las Vegas, a new company, has asked authority from the Federal Power Commission to build a 114-mile natural-gas pipe line from near Topock, Ariz., to Las Vegas.

The proposed line would cross some of the most rugged desert terrain in the West, including crossing of the Colorado River. Cost of construction is estimated at $2,331,350.

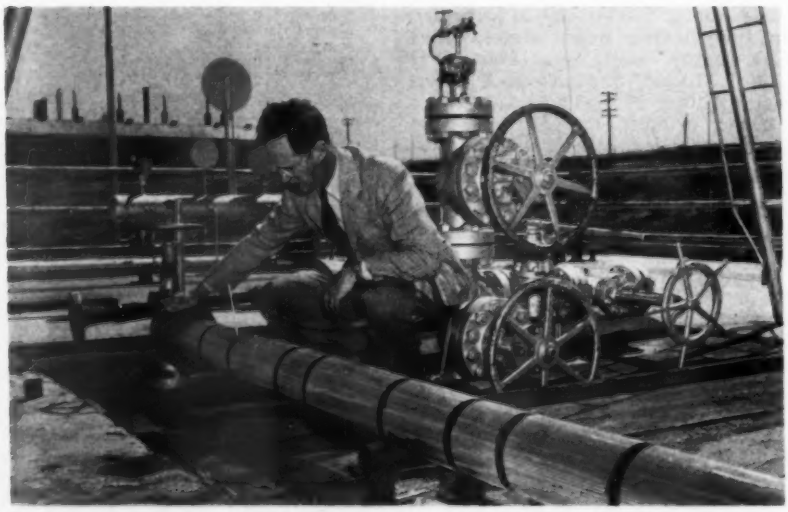
The company plans to sell natural gas to distributing companies in Needles, Calif., and Boulder City and Las Vegas, Nev. Supply of the natural gas would come from the trunkline of El Paso Natural Gas Co. Daily capacity of the proposed facilities is estimated at 17,000,000 cu. ft.

Rate Chairman Named

NEW YORK. — Arthur H. Forbes, rate engineer for East Ohio Gas Co., Cleveland, has been named chairman of the rate committee of the American Gas Association. Appointment was announced by D. A. Hulcy, president.

The committee's duties include studies of various costs involved in supplying gas to different classes of customers, and to recommend forms of rates designed to meet most equitable distribution of such costs, and also secure adequate and just revenue.

Chairman Forbes was graduated from Case Institute of Technology, and has been engaged in public utility valuation and rate work by many organizations and companies.



GAS-INJECTION WELL.—Above is one of the gas-injection wells in the Coalinga Nose Unit, California's largest pressure-maintenance project which will go in full operation by the first of next year (The Oil and Gas Journal, November 23, 1950, page 51). Frank Boyd, production foreman for Union Oil Co., is checking the temperature of injection gas flowing through the insulated line in the foreground.

Natural Gasoline

Production Sets Record

Production at natural-gasoline and cycling plants reached a new all-time high in September, according to the monthly production report of the Bureau of Mines. The average for the month was 515,000 bbl. daily compared with 498,000 bbl. daily in August and 442,000 bbl. daily in September of last year.

September production at cycling plants increased only 1,000 bbl. daily over August, but natural-gasoline-plant output was up 16,000 bbl. daily.

L.P.G. accounted for 14,000 bbl. daily of the total gain of 17,000 bbl. daily. Natural-gasoline production increased 2,000 bbl. daily and finished motor fuel 3,000 bbl. daily, but other products lost 2,000 bbl. daily.

Despite the high level of production in September, light-product stocks decreased 86,000 bbl. during the month.

REFINING

Gasoline Pricing

FTC fights for ruling on old Detroit case

WASHINGTON.—The Federal Trade Commission is awaiting ratification by the Supreme Court of the decision it secured in the Seventh Circuit Court of Appeals against Standard Oil (Ind.) for alleged discrimination in gasoline prices between customers in Detroit.

The 10-year-old FTC complaint against the company charged it with selling gasoline to four tank-car customers at lower prices than it granted its own sales outlets although all four of the favored buyers sold at retail.

A cease-and-desist order issued in 1945 was taken to the courts by the company, which contended the lower prices were granted in good faith to meet the prices of a competitor. The "good faith" issue was a major feature of the O'Mahoney bill to permit sellers to quote delivered prices and absorb freight which was vetoed by President Truman but was pending when the case was heard by the Supreme Court earlier this year.

Although it did not state the reason for its action, an order of the court last spring for a rehearing of argument this term was believed to be designed to defer a decision until settlement of the controversy over the O'Mahoney bill which, if enacted, would have overturned the circuit-court ruling.

Doubts indicated. — Questioning from the bench during reargument of the case indicated that at least two Supreme Court justices held doubts of the FTC policy on pricing. Associate Justice Robert Jackson held that the FTC order called for price maintenance and commented that if the company followed it the Department of Justice might bring suit under the antitrust act, while Associate Justice Hugo Black expressed uncertainty whether the commission was trying to put the wholesalers out of business or seeking to have the company quote the same price to all customers.

Arguing the commission's case, James Cassedy, FTC attorney, contended the company should be required to modify its pricing practices so as to prevent competitive injury. He denied Black's viewpoint, explaining that the commission felt the company should have separate prices for wholesalers and retailers which should be reached only on the basis of actual cost.

Company argument. — Presenting the company's argument, Howard Ellis, its attorney, pointed out that the Department of Justice has always held that good faith in meeting the lower prices of a competitor is a complete defense to price discrimination charges, and William Simon, attorney for a dozen jobber groups, supported the company's position.

Ellis told the court the members of FTC are divided among themselves on the issue raised in the case, and said the company would have lost the four accounts on which the commission based its case if it had not met the lower prices offered by competitors. Cassedy admitted that five major companies offered to sell to the four buyers, and Cyrus Austin, attorney for the National Congress of Petroleum Retailers, pointed out their offers would not be possible if the court upheld the lower court decision.

Catalytic Units Readied

NEW YORK. — Smaller designs of its new catalytic cracking units have been announced by Socony-Vacuum Oil Co., Inc. The new units can be prefabricated for erection at refineries unable to afford the standard facilities.

The later type raises the catalyst by compressed air to a height of 200 ft., replacing the bucket elevators formerly used. Eight of these new "gas-lift" units are being built in Socony-Vacuum refineries which formerly used fixed beds of catalyst. Their combined capacities will be 40,000 bbl. more per day than their predecessors. Four also are being built under licenses to other American oil companies. Two more are being erected in company refineries abroad, and three have been licensed to other European refiners.

Kansas Refinery to Expand

CHICAGO.—Standard Oil Co. (Ind.) has started engineering work on an expansion program that will approximately double the daily capacity of its refinery at Neodesha in Wilson County, Kansas.

Dr. M. G. Paulus, vice president in charge of manufacturing, reported the first step will revamp the existing crude-oil distillation, coking, and rerunning units. The installation will advance daily capacity by 9,000 bbl. Other facilities will include new tankage and utilities equipment.

Surplus cracking stock will be transferred to Standard's refinery at Sugar Creek, Mo., where it will be processed in the catalytic cracking unit installed there in 1948. Completion of the first expansion step is scheduled for early 1952. Later plans provide for a catalytic cracking unit

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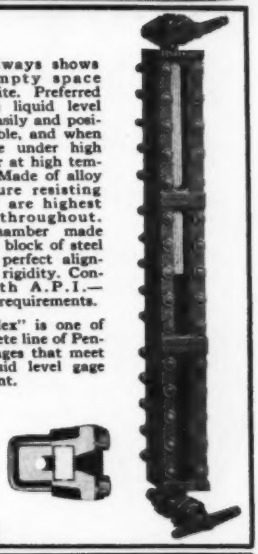

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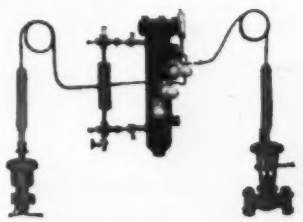

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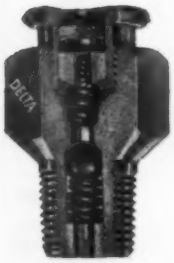

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in the Neodesha plant to bring the processing facilities into complete balance.

Expansion of the refinery gains significance from the abrupt revision of plans which had called for its closing. First announcement of the abandonment was made in 1946, with the closing date set for 1949. The operations of the Kansas plant were to be consolidated with those of other Standard refineries. The improved civilian and military demand for more and improved petroleum products caused the change in plans. E. A. Metcalf is the refinery superintendent.

Texas Platformer Ordered

CORPUS CHRISTI. — A Platforming unit having a daily capacity of 4,000 bbl. will be installed in the Port Isabel refinery owned jointly by Taylor Refining Co. and Mayfair Minerals, Inc. Announcement of the expansion was made by G. L. Rowsey, Taylor president, and V. E. Cooks, president of Mayfair.

The new unit is one phase of a modernization and extension program set for the refinery located near Brownsville, and will permit the production of higher octane gasoline.

New Carbon-Black Project

SARNIA, Ont. — Construction of a carbon-black plant costing an estimated $1,000,000 is projected here by Godfrey L. Cabot, Inc., Boston. Plans for the plant were announced by Russell G. Allen, vice president, who reported a chosen site south of here.

Details of the plant's design and capacity have not been finalized as construction work cannot start until weather permits next year. It is expected the local Polymer plant will absorb a portion of the output, the rest being marketed to Canadian rubber firms.

Terminal Unit Completed

PETROLIA, Ont.—First unit of a $350,000 marine terminal, part of an $18,000,000 refinery expansion, has been completed by Canadian Oil Companies, Ltd., at Parry Sound. Two 50,000-bbl. tanks have been built and bases are laid for additional units that will expand capacity to 300,000 bbl.

The terminal integrates a program which includes a refinery installation at Froomfield on the St. Clair River and a $2,000,000 blending and grease plant now nearing completion in Montreal. A loading rack for tank cars has been finished and a rack for loading tank trucks is under way. The terminal will serve northern Ontario outlets, products being brought from the refinery by tanker.

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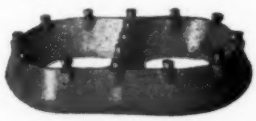

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"Way Out West in Kansas"

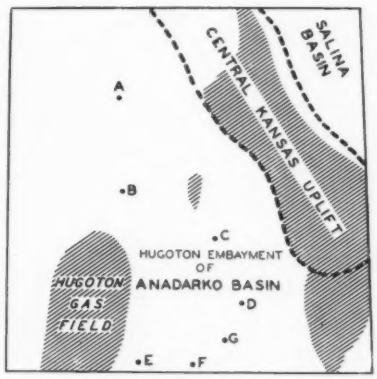
THAT portion of Kansas which lies south and west of the northwest-southeast-trending Central Kansas uplift has yet to yield a significant oil field. For years there has been intermittent wildcat drilling near and out from the tremendous Hugoton gas field, but only a few small oil and/or gas pools have been found. Out of this area of some 25,000 sq. miles, less than 20 million barrels of oil have been proven—not as much as already produced by any one of a number of pools on the arch just to the northeast. Shaded areas on the accompanying map indicate major concentrations of production in the western half of Kansas.

Right now there is a little flurry of wildcat activity north and east of Hugoton field which may be the beginning of development which could eventually result in the elimination of the word "potential" from the area's current classification as a potential oil-producing province. This flurry of activity has been brought on by a few scattered successes. Though the newly found reservoirs have not been sufficiently developed to appraise their true significance, production from the discovery wells is definitely more encouraging than the limited shows established by older tests in the area.

The completion of Shell Oil Co. 1 Springer (C on map) last June stirred up a local storm of considerable strength. This discovery well of Jetmore Townsite pool had a potential of 1,385 bbl. of 38°-gravity oil from the Mississippian at about 4,600 ft. However, the excited interest in this new pool was soon calmed by the completion of a dry hole. The third well, now testing, should make a small producer.

In August, Skelly Oil Co. 1 McKinney (F on map) initialed nearly 15 million cubic feet of gas from Mississippian rocks at several intervals between 5,762 and 5,827 ft. A second well in McKinney gas field is now drilling.

Up north in Thomas County, Westgate-Greenland Oil Co. thought enough of oil indications in the Fort Scott member of the Pennsylvanian-Marmaton to run pipe and test its 1 Hebrel (A on map). Commercial production could not be developed, however.



About 1½ miles southeast of Pleasant Valley oil and gas pool, one of the few scattered pools in the area, Rufus Clay 1 Birney (D on map) has been completed recently for 12 million cubic feet of gas from the Mississippian topped at 4,928 ft.

The most recent encouragement of note is Herndon Drilling Co. 1 Reuter (B on map) which made 200 bbl. of 26°-gravity oil with no water during a 7-hour test of the Kansas City. No oil was found in the Kansas City samples, but a drill-stem test, run on the basis of odor only, yielded 1,650 ft. of oil from the completion interval at about 4,000 ft. The electric log of the hole shows several Lansing-Kansas City kicks that are similar to the known oil-bearing interval. The Mississippian-St. Genevieve, productive in Shallow Water pool 15 miles southwest, is missing in Herndon's well. Though the northern limits of the St. Genevieve are known to be in this vicinity, its absence in the Herndon well could indicate the presence of an Arbuckle high and an offset to the pool opener will probably explore this possibility. About 10 miles west of this successful wildcat Herndon is starting another seismic-high test.

Other active wells in the area which have had substantial shows of oil and/or gas: Stanolind Oil & Gas Co. 1 Wall (G); Lansekan, Inc. 1 Kneeland (E); and, Columbian Fuel Corp. and United Producing Co. 1 Novinger, 6 miles northeast of the Lansekan well. Two other operations in the area have not yet dug deep enough to cut possible oil-bearing horizons.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Honolulu and Signal's 2 Hopper, diagonal northwest offset to the 1-13 Underwood, Ropes field discovery in Hockley County, flowed 25 bbl. of oil hourly on a drill-stem test from 9,335-50 ft., but failed on a test at 9,360-80 ft. According to some sources, it was thought to be in a lower pay strata than the discovery. One-half mile south of the Spires Strawn discovery, Sunray Oil Corp. 2 Spires recovered 570 ft. of heavily oil and gas-cut mud from 6,961-97 ft., and was taking another test from 6,964-7,017 ft. The 2 Spires was dry at 6,884 ft., in the Strawn, and is being redrilled to the Ellenburger or to 7,500 ft.

ROCKY MOUNTAIN AREA.—British-American Oil Producing Co. is completing its best discovery in the current Denver-Julesburg Basin play. The Yenter area, Logan County, wildcat flowed 425 bbl. of oil daily through choke. Three interesting wildcats are now drilling in the Uintah Basin of Utah, with Carter Oil Co.-Stanolind Oil & Gas Co.'s Blue Bell wildcat now below 10,585 ft. Stanolind Oil & Gas Co.'s second Tensleep well at Beaver Creek, Wyoming, flowed 75 bbl. of oil in 2 hours and 45 minutes and testing is continuing.

CANADA.—Okalta Oils, Ltd., is continuing coring and testing at its Ireton 1, apparent extension in the South Leduc area. Central-Del Rio's second Acheson venture also is an indicated success.

XUM

Rocky Mountain

British-American Brings in Good Well at Yenter

DENVER.—Tests on the British-American Oil Producing Co. discovery in the Yenter area, west of Sterling, Logan County, Colorado, have confirmed a good producer and development will start immediately in the area. The well, 1 Koenig-Ashby, NE NE NW 3-8n-54w, flowed 20 bbl. of oil per hour for an initial and made 425 bbl. through ⅝-in. choke in 24 hours. Production is from the "J" sand between 5,240-50 ft. Further east in the basin, Ryan Oil Co. completed a failure in the Dailey area at 1 Wood Land Co., NE NE SE 11-7n-48w, Logan County. This well found a thick sand section between 3,903-80 ft., and staining in the zone 3,895-3,905 ft. However, the well tested water in both zones. Nix and Harris of Oklahoma City completed their second failure in the basin at 1 Shaeffer, C NW SW 22-8n-55w, in the Willard area, on a farmout from Carter Oil Co. The well was drilled to 5,725 ft. in the Lakota.

Three interesting operations are underway through the Uintah Basin of northeastern Utah. California Co. has spudded its wildcat at 1 Unit, NE NE NE 26-7s-23e, in the Red Wash area. This well will test basal Green River zones at around 6,000 ft. Carter Oil Co. is drilling below 6,070 ft. at its 1 Burnett, C SW SW 34-4s-11w, in the Strawberry Reservoir area, Wasatch County, on the west side of the basin. Carter and Stanolind Oil & Gas Co. are coring and testing below 10,585 ft. at 1 Unit, C SW NE 6-1s-2w, a wildcat in the Blue Bell area, Duchesne County. The latter well is just west of Carter and Stanolind's basal Green River production in the Roosevelt field, and outcome of the present test is of importance for future operations here.

The second Tensleep well in the Beaver Creek field, Fremont County, Wyoming, will apparently be an excellent oil producer. Tensleep was topped in Stanolind's 12 Tp Unit at 11,110 ft., and the well was drilled to 11,599 ft. in that formation. It flowed 74 bbl. of oil in 2 hours and 45 minutes, and the operator is continuing to test.

COLORADO SUCCESSFUL WILDCAT

Buckingham, Weld County: Shell Oil Co. 1 Hulda A. Hanson, NE NE NE 33-8n-59w, TD 7,234 ft., pumped 32 bbl. oil in 24 hours, 8⅝-in. csg. 823 ft., 5½-in. csg. 6,871 ft., Niobrara 5,968 ft., Timpas 6,218 ft., Benton 6,273 ft., Muddy 6,707 ft., Dakota 6,793 ft., Lakota 7,601 ft.

COLORADO WILDCAT FAILURES

Cheains area, Logan County: British-American Producing Co. 1 Rieke, NE SW SW 33-10n-54w, TD 5,764 ft., dry. Niobara 4,350 ft., Carlisle 4,697 ft., Greenhorn 4,893 ft., "D" sand 5,135 ft., "J" sand 5,245 ft., "O" sand 5,488 ft., Morrison 5,730 (?) ft.

Ft. Morgan, Morgan County: Platte River Oil & Gas 1 Fuerst, NE NE NW 1-3n-59w, TD 6,620 ft., dry.

WYOMING WILDCAT FAILURES

Big Horn area, Hot Springs County: British-American Oil Producing Co. 1 A. C. Melton, SW SW NW 5-43n-94w, TD 3,725 ft., dry. Mowry 520 ft., Muddy 1,067 ft., Thermopolis 1,107 ft., Cloverly 1,277 ft., Dakota 1,345 ft., Fuson 1,393 ft., Lakota 1,473 ft., Morrison 1,507 ft., Sundance 1,803 ft., Gypsum Springs, 2,070 ft., Chugwater 2,193 ft., Alcova 2,490 ft., Dinwoody 3,289 ft., Phosphoria 3,344 ft., Tensleep 3,617 ft.

East Sussex, Johnson County: Earl Mallette 1 Govt., NW SE NW 29-41n-77w, TD 7,522 ft., dry. Sussex 4,574 ft., Shannon 5,050 ft., first Wall Creek 6,975 ft.

East Teapot, Natrona County: Midland Oil Co. 1 Govt.-Van Meter, NW SE NE 11-38n-78w, TD 3,556 ft. Shannon 968 ft., First Wall Creek 2,170 (?) ft.

Midland Oil Co. 2 Govt., CN½ SE NE 11-38n-78w, TD 2,355 ft., dry.

West Lusk area, Niobrara County: Keeline Syndicate 1 A. S. Heine, NW NW NW 17-32n-65w, TD 1,597 ft., dry. Pennsylvanian 184 ft., Minnelusa 245 ft., Bell sand 840 ft., Madison 950 ft., Mississippian 968 ft., Deadwood 1,232 ft., pre-Cambrian 1,285 ft.

Tosi Creek, Sublette County: H. D. Mollohan 1 Govt., C NE NE 22-39n-111w, TD 625 ft., dry.

MONTANA SUCCESSFUL WILDCAT

Sumatra area, Rosebud County: Farmers Union Central Exchange and Mule Creek Oil Co. 1 Sawyer, C NE SW 26-11n-32e, TD 5,277 ft., 10¾-in. csg. 346 ft., 7-in. csg. 5,254 ft., pumped 225 bbl. clean oil per day, Judith Basin 783 ft., Claggett 995 ft., Eagle 1,396 ft., Mosby 2,506 ft., first Cat Creek 3,557 ft., Kootenai 3,649 ft., third Cat Creek 3,867 ft., Ellis 4,112 ft., Reardon 4,322 ft., Piper 4,502 ft., Amsden 4,635 ft., basal Amsden sand 4,812 ft., Heath 5,260 (?) ft.

WESTERN NEBRASKA WILDCAT FAILURES

Ogallalla Brule area, Keith County: Ohio Oil Co.-R. A. Goodall 1 Kahl, NW NW NE 1-13n-41w, TD 3,706 ft., dry. Pierre 804 ft., Niobrara 2,430 ft., Ft. Hays 2,689 ft., Greenhorn 2,975 ft., "D" sand 3,163 ft., "M" sand 3,505 ft., Morrison 2,383 ft.

North Bridgeport, Morrill County: Musgrove Corp. 1 Prey, NW NW NW 34-23n-51w, TD 4,306 ft., dry. Niobrara 3,245 ft., "D" sand 4,097 ft., "J" sand 4,270 ft.

Canadian Fields

South Leduc Extension Tests Devonian Oil

CALGARY.—In the South Leduc extension area, about 1½ miles southwest of McLeod D2 Devonian oil pool, Okalta Oils, Ltd., of Calgary has indicated oil success in the Devonian at its Ireton 1. The well, located in LSD 6, 13-49-26w4, ran the following two drill-stem tests: at 5,263-85 ft., maximum gas blow 130,000 cu. ft. daily, pipe recovery 120 ft. of oil-cut mud; at 5,281-5,300 ft., maximum gas blow 169,000 cu. ft. daily, pipe recovery 500 ft. of oil. The exploratory test is located about 1½ miles southwest of Miller, Pyrcz & Robert's Schultz 1, D2 producer, and 1¾ miles southsouthwest of Leduc Calmar-P.C.M.-Spokane Oils 1 Coring and testing is proceeding.

Central-Del Rio-Acheson 2 well flowed oil and gas in drill-stem test to indicate a successful first follow-up to Central-Del Rio's Lower Cretaceous sand oil discovery in the Acheson area. This second well is located in LSD 5, 13-53-26w4, ¼ mile north of 1 Acheson, and about 1¾ miles northeast of California-Standard's Devonian discovery. Acheson 2 tested at 3,938-3,943½ ft., and brought a flow of gas to the surface in 2 minutes, oil in 14. Flow rate was 34 bbl. hourly. The second test, from 3,941½-47 ft. gave gas in 2 minutes and oil in 16, with flow rate over 50 bbl. hourly. Production string of casing has been set and the well will go on production tests shortly.

First independent venture to be drilled close in in the Camrose area where Socony-Vacuum Exploration Co. made a dual zone Devonian oil discovery, is Basin-Norway 1, in LSD 15, 7-45-21w4, about 1⅛ miles southwest of Socony-Flint 1, oil discovery. The venture is backed by Basin Petroleums, Ltd., Central Patricia Gold Mines, Ltd., Ryanor Mining Co., Ltd., Conwest Exploration Co., Ltd., and Flank Petroleums, Ltd.

EASTERN CANADA

Manitoba.—The first authenicated oil discovery in Manitoba has been reported from Souris Valley Oil Co. Downey 1, 17 miles south of Melita. A report of Dr. J. D. Allan, chief government geologist, and G. D. Springer, geologist with the provincial mines branch, stated that the well topped the Mississippian lime at 3,22 ft. Coring at 3,223-8 ft., it recovered 3 ft. of core with fine pin-point porosity saturated with live light oil. In a drill-stem test at 3,221-28 ft. 30 ft. of oil-cut mud were recovered, with no salt water.

Southwest Texas

Williamson County Test Is Shallow Dale Prospect

CORPUS CHRISTI.—Stanley A. Thompson has good indications of a Dale lime discovery well approximately 10 miles southeast of the Taylor townsite, Williamson County. The prospective discovery is 1 L. F. Wolf, Jefferson West Survey, which is presently testing. Hole is bottomed at 1,462 ft. and operator set 4-in. production string at 1,436 ft. and is testing from open hole. Top of the Dale lime horizon is reported at 1,438 to 1,462 ft.

Chiles Well Servicing Co. is coring ahead in 1 D. C. Chapa, wildcat in Share 8, El Mesquite Grant, Duval County, after running drill-stem test. Operator perforated from 2,996-3,013 ft. using ¼-in. and ⅜-in. chokes, and recovery was 540 ft. of oil-cut mud. Bottom-hole flowing pressure was 270 psi.

O. W. Killam 1 R. Holbein, Jim Hogg County wildcat, is waiting on orders at total depth of 4,084 ft. Operator cored a saturated oil sand from 2,920-30 ft. This wildcat is located in Lot 6, Block 24, Share 3, Las Animas Grant, Abstract 244.

Rudco Oil & Gas Co. has perforated from 4,100-12 ft. and is rigging up pump to test 1 Yturria Land & Livestock Co., wildcat approximately 3 miles south of Yturria field, Starr County. Before setting pipe at 4,130 ft., operators took sidewall samples at 4,094 ft. and had sand with a slight odor; at 4,100 ft., 4,099 ft. and 4,101 ft. and had sand with a show of oil. Sand at 4,102 ft. had a sand with a slight gas odor. This prospective producer is located 4 miles northwest of Sullivan City and 2 miles east of Garcia field.

Midstates Oil Corp. has completed an excellent Austin chalk producer in Pearsall field of Frio County. The operator's 1 Halff & Oppenheimer, Simeon Glenn Sur. 335, Abstract 341, was completed from open hole at 5,309-692 ft. for 299 bbl. of oil per day through ¼-in. choke.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

McMullen County: H. R. Smith and American Republics Corp. 2 J. C. Dilworth, Jr., Rafael Vasquez Sur. 42, A-486, 6½ mi. W Tilden, pay 5,435 ft., TD 5,876 ft., perf. 5,435-41 (Wilcox), 146 bbl. oil per day, 10/64-in. choke, TP 475 psi., 42° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Wilcox Oil Co. 1 Mrs. Isabel Huizar, L. English Sur. 1,128, A-277, 2 mi. SE Leming, dry, TD 5,208 ft.

Bell County: Pryor Dillard 1 Justine Alleh. John J. Simmons Sur., 5 mi. N Belton, dry, TD 890 ft.

Caldwell County: Sid Katz 1 Emil A. Riedel, John P. Bell Sur., 4 mi. N Lockhart, dry, TD 1,945 ft.

Frio County: Martin, Shelly & Thomas 1 Virgil Toalson, Block 22, Pablo Ortiz Sur. 1,411, A-530, TD 4,375 ft.

Gonzales County: Ryan, Hays & Burke 1 J. J. Gatlin, William Newman Sur., 8 mi. S SW Gonzales, dry, TD 2,425 ft.

Travis County: George-Radar Co. 1 John W. Kamp, Peter B. Harrison League, 30 mi. S Elroy, dry, TD 1,020 ft.

H. G. Goss 1 Jim Lockwood, Richard Duty heirs, 4 mi. S Littic, dry, TD 2,050 ft.

L. M. White 1 H. W. Schiller, Pedro Rodriquez Sur., 3 mi. SW Coupland, dry, TD 1,004 ft.

Zavala County: David S. Ring 2 Jos. L. Matthews, I&GN RR Sur. 32, 2½ mi. SW LaPryor, dry, TD 6,238 ft.

Permian Basin

Scurry County Has Apparent Strike

MIDLAND.—Scurry County had another prospective Ellenburger discovery at Amerada Petroleum Corp. 1 E. M. Houston, 8 miles south of Snyder and north of Sharon Ridge shallow field. The well entered the Ellenburger at 7,784 ft., or minus 5,556 ft., which was correlated 146 ft. low to Honolulu Oil Corp. 1 Brown, Ellenburger failure 5 miles to the east.

A 4-hour drill-stem at the 1 Houston, from 7,773-7,819 ft. recovered a total of 1,450 ft. of oil, and unloaded 630 ft. of that while pipe was being pulled. Flowing pressure ranged from 150-1,750 psi. during the test, and registered 3,200 psi. after shut in 15 minutes. Gravity of the oil was 41.5°.

Northeast of the Ropes Pennsylvanian field discovery, in southern Hockley County, Honolulu and Signal's 1-9 Beulah L. Burleson flowed oil at the rate of 50 bbl. hourly on drill-stem test. Drill pipe was full of oil when pulled and recovery was not reported. The test was run from 9,245-72 ft., in a reef section. According to reports, the well is high on the formation to the field's discovery.

In Cotten field of Terry County, Phillips Petroleum Co. 1 Cotten, west offset to the discovery, was 83 ft. low to the pool opener in topping the Pennsylvanian reef at 9,998 ft., on elevation of 3,267 ft.

Humble Oil & Refining Co. completed its 1 W. C. Dulin in Mississippi lime marking a new pay in Ellen Draw reef field of Lynn County. Location is a northwest offset to Magnolia Petroleum Co.'s 1 Garza. The 1 Dulin was drilled to 9,385 ft., and plugged back to 9,081 ft. Perforations from 9,020-80 ft. yielded 135 bbl. of 33°-gravity oil in 24 hours on the pump, plus some formation water.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Ector County: J. K. Dobbs 1 E. F. Cowden, 6-42-2S-TUP, 1¾ mi. SE Donnelly San Andres field, TD 4,252 ft., elev. 3,050 ft., Grayburg 3,900 ft., top pay 3,902 ft., shot 3,975-4,247 ft., IP pumped 92 bbl. 33°-gravity oil a day, GOR 200 cu. ft.

Hockley County: Humble Oil & Refining Co. 1 J. J. Hobgood, Labor 10, League 693, State Capitol Lands, ½ mi. S Lamb County line, 8 mi. NE Yellowhouse field, TD 10,179 ft., elev. 3,470 ft., PB 6,690 ft., top Clear Fork 5,390 ft., pay 6,655 ft., perforated 6,665-75 ft., IP pumped 130 bbl. 24°-gravity oil a day.

Runnels County: A. J. Renn Trustee 1 D. O. Kennedy, J. H. Wilson Sur. 144, 7 mi. NE Ballinger, TD 2,318 ft., elev. 1,773 ft., Serratt sand 2,314 ft., IP pumped 123 bbl. 39°-gravity oil a day.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: Geier-Jackson, Inc. 1 Morgan Coates, 12-27-H&TC, 1 mi. N East Vealmoor field, dry, TD 1,530 ft.
Geier-Jackson 1-A Morgan Coates, 12-27-H&TC, junked at 215 ft.

Crockett County: Humble Oil & Refining Co. 1-D Alma Cox, 4-QR-GC&SF, 3 mi. W Ozona, dry, TD 8,203 ft., elev. 2,520 ft., Wolfcamp 5,080 ft.

Dawson County: Dan Auld and V. A. Brill 1 C. B. Grissom, 17-34-4N-T&P, 3½ mi. SW Spraberry field, dry, TD 9,562 ft., elev. 2,886 ft., Spraberry 7,050 ft., Dean sand 8,356 ft., Reef 9,119 ft.

Hockley County: Callery & Hurt 1 R. J. Edwards, Labor 1, Lge. 7, Wilbarger CSL, 1 mi. N Balch, dry, TD 9,860 ft., elev. 3,337 ft., San Andres 3,912 ft., Clear Fork, 5,630 ft.

Kent County: Gulf Oil Corp. 1 A. C. Cairns, 50-G-W&NW, 2½ mi. SW Clairmont Strawn field, dry, TD 7,546 ft., elev. 2,269 ft., Pennsylvanian 6,871 ft., Mississippian 7,295 ft., Ellenburger 7,526 ft.

Kimble County: R. F. Schoolfield 1-D A. D. Rust "B," Sec. 1, CCSD&RGNG Sur.,

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A-793, 18 mi. NW Junction, dry, TD 2,115 ft.

King County: Ard Drilling Co. 6-W Masterson, Sec. 19, I&RR Sur., dry, TD 4,500 ft., elev. 1,841 ft., Canyon 4,380 ft.

Runnels County: R. W. King, Jr. et al 1 Brookshire Estate, BS&F Sur. 31, 5 mi. E Bronte, dry, TD 5,452 ft., Saddle Creek 2,710 ft., Home Creek 3,750 ft., Ellenburger 5,230 ft.

Saxon Exploration Co. 1 Opal Bouldin, A. G. Wills Sur. 3, 3 mi. NW Tapia, dry, TD 3,690 ft., elev. 1,879 ft., Gardner sand 3,547 ft.

Terry County: Champlin Refining Co. 1 Lindsley, 45-E-ELRR, 12 mi. NE Brownfield, dry, TD 10,370 ft., elev. 3,201 ft., Spraberry 7,039 ft.

Tom Green County: Humble Oil & Refining Co. 1 Mrytle Lewis, Joseph Gobel Grantee Sur. 834, 14 mi. SW San Angelo, dry, TD 6,915 ft., elev. 2,034 ft.

SOUTHEAST NEW MEXICO

HOBBS. — In northeastern Lea County, Ralph Lowe 1 Dickenson, 35-14s-37e, following a drill-stem test from 12,248-85 ft., which unloaded several stands of oil. Top of the Devonian, by samples, was 12,245 ft., or minus 8,428 ft. A 1,500-ft. water blanket was used on the test and the tool was open 2½ hours.

Amerada Petroleum Corp. 2 Caudle, 3-12s-33e, northwest extension to Bagley-Hightower Pennsylvanian field, found additional pay on a test from 9,030-60 ft. The well has indicated gas-distillate production from 8,565-8,717 ft., and a 4-hour drill-stem test at 8,914-9,005 ft. recovered 720 ft. of gas-cut mud. From 9,005-9,030 ft. recovery was a small amount of drilling mud, and 525 ft. of 48°-gravity oil. Last reported test, open 4 hours, at 9,030-60 ft., had gas at the surface in 2 minutes, followed by oil in 29 minutes. Four hourly gages were: 4.14 bbl., 3.28 bbl. ,5.52 bbl., and 2.76 bbl. Mud cut averaged about 2 per cent.

South Louisiana

Deepest Well in Block 32 Continues Below 11,636 Ft.

NEW ORLEANS. — Offshore from Terrebonne Parish, Kerr-McGee Oil Industries, Inc. is drilling below 11,636 ft. at D-1 State Lease 755, in the Ship Shoal Block 32 field. This is the deepest test yet drilled on this structure and is slated to go ahead to the salt. Drilling was temporarily halted at 11,084 ft. to run electrical survey and pull 10 sidewall samples, but no showings were reported. Discovery of this field was Kerr-McGee 1 State Lease 754, Block 32, which was completed in 1947 for 600 bbl. of oil per day through perforations at 1,734-50. Hole was bottomed at 2,563 ft. in salt.

Efforts to confirm oil production in the new Burtville field, East Baton Rouge Parish, failed at Bateman Drilling Co. 1 Joubert Bros., 17-8s-1e, Iberville Parish, which was abandoned at total depth of 11,010 ft. This field was discovered in August of this year at Shell Oil Co. 1 Vivian J. Gianelloni, 47-8s-1e, which flowed 370 bbl. of 47.6°-gravity oil daily through perforations at 10,876-90 ft. Northeast of the discovery, Shell is currently drilling at 5,300 ft. at 2 Gianelloni.

In Acadia Parish, Sun Oil Co. 1 N. W. Hensgens, 14-9s-1w, semiwildcat, is at total depth of 10,762 ft. and operators are testing. On 3-hour drill-stem test, through perforations at 10,316-22 ft., recovery was 750 ft. water cushion, 1,500 ft. of oil and 800 ft. of salt water. Gravity of the oil was 32° gravity and bottom-hole flowing pressure 655 psi. Operators are still testing the well.

In Manila Village field, Jefferson Parish, Tide Water Associated Oil Co. has abandoned its 1 Watt at total depth of 13,484 ft. after extensive testing. Seven sections in this well were tested over a period of several months. Manila Village was discovered last year and currently has two producing wells, which are flowing under extremely high pressures.

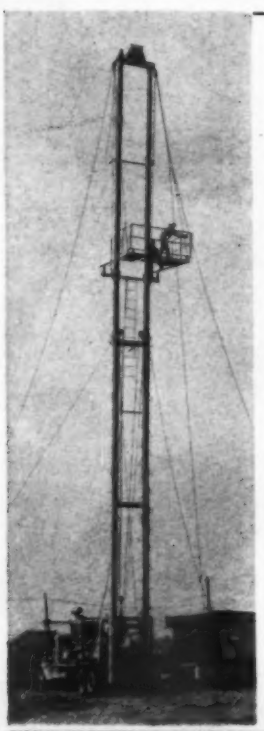
Texas Gulf Coast

Gohlke Discovery Gets Confirmation

HOUSTON. — Shell Oil Co. B-1 F. W. Gohlke heirs, W. H. Grain Survey 10, Abstract 637, DeWitt County, confirmation test to the new Helen Gohlke Wilcox strike, flowed 433 bbl. of 33.6°-gravity oil per day through ¼-in. choke. Casing pressure was 700 psi. and tubing pressure 1,625 psi. Total depth of the producer is 8,275 ft. and production is through 40 jet-perforations at 8,140-50 ft. It is reported that this test, which is 1,800 ft. southwest of the discovery well, is 15 ft. structurally higher on the pay sand and also has 10 ft. more effective pay than did the discovery.

Hawn Bros. and associates recorded a flowing gage of 160 bbl. of oil in 24 hours at 1 E. C. Schaefer, new discovery well in Jas. Duff Survey, Abstract 153, DeWitt County. The flowing gage was recorded through ¼-in. choke with tubing pressure of 1,105 psi. Gravity of the crude was 35.4°. The well is bottomed at 8,000 ft. and production is through perforations at 7,610-14 ft.

Fred W. Shield and associates are continuing to core at their 1 C. K. McCan et al, M. J. Traviesa Survey, Victoria County, wildcat 5 miles southeast of McFaddin. A



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core was taken from 5,408-16 ft. to recover wet sand. A 20-minute drill-stem test of this interval recovered 1,080 ft. of salt water with a scum of oil on top.

Fred field of Tyler County has been extended with completion of Stanolind Oil & Gas Co. 5 James F. Parker, east outpost located in Geo. T. W. Collins League. Through perforations at 8,529-39 ft. the well flowed 72 bbl. of 43°-gravity oil plus 7 bbl. of wash water. Tubing pressure varied from 75 to 275 psi. Operators may go back in and reperforate from 8,529-42 ft. in the well.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Calhoun County: William Hebert Hunt 1 W. L. Traylor, Phillips Dimmit Sur., E. shore of Lavaca Bay, 6 mi. NW Olivia. TD 9,384 ft., perf. 8,816-23 ft., 540,000 cu. ft. of gas per day, open flow, SITP 3,538 psi.

Liberty County: British American Oil Producing Co. 1 W. P. H. McFadden et al, James McFadden Sur., A-76, TD 6,572 ft., pay 5,853 ft., perf. 5,856-64 ft., 135 bbl. oil per day, 8/64-in. choke, TP 735 psi., 30° gravity.

Newton County: Houston Oil Co. et al A-1 Earl C. Hankamer, R. L. White Sur., A-922, East Gist area, pay 7,193 ft., TD 7,320 ft., perf. 7,198-99 ft., 240 bbl. oil per day, 10/64-in. choke, TP 1,150 psi., 38.6° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Fort Bend County: Livingston Drilling & Well Servicing Co., Inc. 1 O. H. Wolters, Samuel Kennedy Sur., A-44, 2½ mi. S. Thompson, dry, TD 5,476 ft.

Hardin County: W. G. Christian 2 Chas. G. Hooks et al, C. Choate Sur., A-153, 2 mi. N Batson, dry, TD 1,520 ft.

Harris County: Commercial Petroleum & Transport Co. 1 Herbert S. Crawford unit, Christian Smith Sur., A-69, 5 mi. NE Baytown, dry, TD 6,462 ft.

J. Brian Eby 1 Claud B. Hamill, William Ritchie Sur., A-650, 5 mi. SW Humble, dry, TD 4,927 ft.

Texas Co. 1 L. E. Morrison, L. C. Reed Sur., A-1,554, 3 mi. SE Katy, dry, TD 8,300 ft.

Liberty County: John W. Mecom 4 General Crude, David Kokernut Sur., A-60, dry, TD 11,924 ft.

Live Oak County: Texas Eastern Production Co. 1 Kittie West Schreiner, Samuel Vanover Sur., A-727, 3 mi. NE E. Maxine field, dry, TD 8,058 ft.

Montgomery County: Capital Co. 1 H. W. Fling, John Corner Sur., A-8, 1½ mi. E Montgomery, dry, TD 4,460 ft.

San Jacinto County: J. Newton Rayzor 1 Foster Lumber Co., John S. Brown Sur., A-68, 3 mi. S Cold Springs, dry, TD 5,657 ft.

Wharton County: H. L. Hunt 1 Louise Ullmann, R. Jones ½ League, A-36, 1 mi. S Wharton, dry, TD 6,311 ft.

R. A. Welch et al 1 Geo. M. Wilson, William Robinson Sur., A-55, New Taiton area, dry, TD 12,008 ft.

Appalachian Field

Four Wells Drilling in Mountain Lake Park Area

PITTSBURGH.—In the Mountain Lake Park section of Garrett County, Maryland, Eberly & Snee have located 1 Gordon. These operators are drilling three other wells: 1 E. O. Donald, 1,280 ft.; 1 Camp Meeting Holiness Association, 979 ft., and 1 fee, moving in. Columbian Carbon Co. 1-1503 Oren T. Graser is shut down at 2,878 ft. to case, and 1 Joni J. Miller is drilling at 300 ft. George L. Yaste 1 Grimes is spudding at 30 ft.

In the Steele district of Wood County, West Virginia, Hope Natural Gas Co. 9468 Frank Gilmore, elevation 827 ft., resulted in 3,341,000 cu. ft. of gas, natural, from Corniferous lime at 4,892 ft. Oriskany sand was topped at 5,016 ft., with gas found at 5,017-31 ft. Total depth is 5,031 ft. Glen W. Roberts 1 Robert W. Ayers, elevation 985 ft., topped the Oriskany sand at 5,240 ft., with gas at 5,248-58 ft., gaging 3,953,000 cu. ft. Drilling is at 5,259 ft. A good shallow sand gas well was noted in the Trap Hill district of Raleigh County Hope Natural Gas Co. 9463 D. W. Morley (Unit) tested 1,917,000 cu. ft. in the Maxton sand, at a total depth of 2,089 ft.

In the Napier Township of Bedford County, Pennsylvania, South Penn et al-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., has resumed drilling and is at a depth of 7,916 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district: Hope Natural Gas Co. 9468 Frank Gilmore, elev. 827 ft., 3,341,000 cu. ft., natural, Corniferous lime 4,892 ft., Oriskany sand 5,016 ft., gas 5,017-5,031 ft., TD 5 031 ft.

California

North Antelope Extension Tops Agua at 2,623 Ft.

LOS ANGELES.—Outcome of the potential ⅞-mile extension to North Antelope Hills field of Kern County was still in question at the close of last week. In McDonald Anticline field 6 miles to the southeast, a ¼-mile north extension was completed.

The Antelope wildcat, Tide Water Associated Oil Co. No. 35, Section 14-27s-19e, topped the upper Agua sand at 2,623 ft. and was drilled to 2,692 ft. With 2½-in. casing hung at 2,606 ft., the well yielded some 14°-gravity crude and substantial volumes of water from a perforated zone at 2,658-

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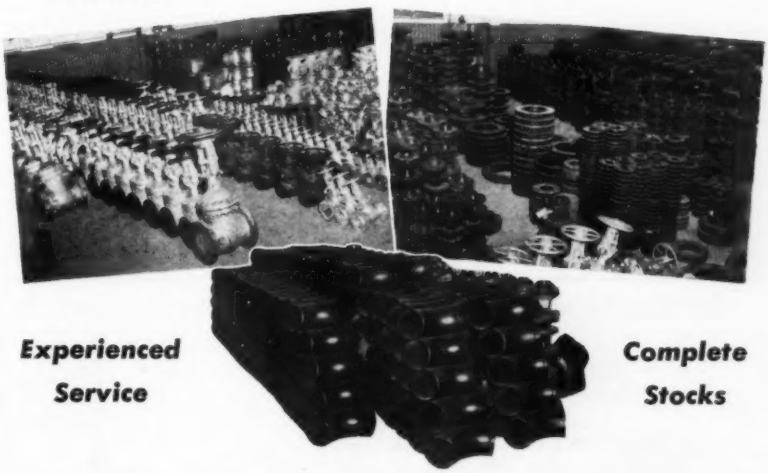

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68 ft. At last reports, the operator was waiting for cement to set following a squeeze job on the lower section.

The test is ⅞ mile northwest of production opened by Shell Oil Co. last June in Section 23. The opener produced from the Agua sand at 2,267-2,360 ft. Since then Shell completed a southeast offset as a 200-bbl. producer and last week finished the eastern offset. The latter flowed 135 bbl. in 15 hours from perforated intervals between 2,517 and 2,630 ft.

At McDonald Anticline, the ¼ mile north extension was a 40-bbl. pumper of 30°-gravity crude, and was the operator's third well in the area they started developing earlier this year. It was Ferguson & Bosworth No. 1 Layman-Honolulu in SW NE Section 18-28s-20e. The stepout topped the Layman sand at 2,041 ft. and the Buttonbed at 2,110 ft., with the first Buttonbed stringer being topped at 2,090 ft. The zone perforated, from 2,034-2,099 ft., opened production in both sands. The operator's two previously completed wells, in SW SE Section 18, were 500 and 200-bbl. flowing wells, respectively.

East Gosford field southeast of Bakersfield was given a one-location extension which apparently has opened gas-condensate production in the field. The well was Union Oil Co. 36-13 KCL in SW Section 13-30s-26e. When first completed it flowed 40°-gravity crude at the rate of 200 bbl. daily, from an interval at 7,700-35 ft. Continued production resulted in the gravity increasing to about 55°, with a daily yield of about 41 bbl. of condensate and 510,000 cu. ft. of gas.

Nevada.—With their 1 Meridian unit idle at a total depth of 10,314 ft., Continental Oil Co. and Standard of California have announced a second wildcat to be drilled about 20 miles east of the above test in Hayden Creek area.

Nevada's third recently started wildcat, McCarthy Oil Co. 1 Rahas, was last reported as idle at 4,125 ft. in the lower Pennsylvanian.

CALIFORNIA UNSUCCESSFUL WILDCATS

Fresno County, Polvadero area: Universal Consolidated Oil Co. 43-12 Orr, 12-21s-16e, dry, TD 11,450 ft.

Kern County, Tejon Hills area: Star Oil Co. 7 "Well," 2-11n-18w, dry, TD 180 ft. in granite, elev. 1,367 ft.

Monterey County, Cholame area: Len Owens 1 Jordon, 19-24s-16e, dry, TD 2,400 ft., elev. 1,550 ft.

San Luis Obispo County, Templeton area: Archie C. Meyers 1 Myers-North-Reinert, 26-27-11e, dry, TD 1,213 ft.

Solano County, West Rio Vista area: Natural Gas Corp. of Calif. et al 1 N. C. Anderson heirs, 28-4n-2e, dry, TD 6,250 ft.

Yolo County, Winters area: Western Gulf Oil Co. 81 Woodward & Reynolds Comm., 13-8n-1w, dry, tested 2,800-62 ft., plugged back to 2,862 ft., TD 5,133 ft., elev. 110 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, north extension (¼ mile), McDonald Anticline area: Ferguson & Bosworth 1 Honolulu-Layman, 18-28s-20e, pumped 40 bbl. per day, perf. 2,034-99 ft., 29.6° gravity, Layman sand 2,041 ft., Buttonbed 2,110 ft., first stringer Buttonbed 2,090 ft., plugged back to 2,099 ft., TD 2,154 ft.

San Luis Obispo County, north extension (¼ mile) Clayton pool of Morales field: Richfield Oil Corp. 1 M. L. Howard, 3-11n-28w, pumped 148 bbl. per day, perf. 2,198-2,433 ft., 36° gravity, plugged back to 2,435 ft., TD 2,642 ft., elev. 2,747 ft.

Mississippi

Forrest County Gets New Test

JACKSON.—I. P. LaRue is planning to drill a wildcat in the southern part of Forrest County with Crow Drilling Co. as contractor. The test will be located in SW SE 7-1s-13w, and is being supported by Gulf Refining Co., Sun Oil Co., Midstates Oil Corp., and Sinclair Oil & Gas Co. It will be drilled 2,000 ft. into the Lower Cretaceous.

Gulf Refining Co. is drilling below 1,884 ft. at its Baldwin County, Alabama, wildcat, its 1 D. B. Simison et al., 43-1n-1e. Contractor on the well is Danciger Oil & Refining Co.

Harry L. Cullet is waiting on cement at his 1 McCarley-Bannister Unit, wildcat in Marion County, Alabama. Total depth is 1,820 ft. and 8-in. casing is being set at 1,265 ft.

R. J. Bartlett and Barnett Serio are preparing to test further at their 1 George W. Armstrong, a wildcat in 37-6n-3w, Adams County, Mississippi. The test pumped 80 bbl. of fluid, half water and half oil, daily through perforations at 6,325-27 ft. By the end of the test, the well was pumping all salt water.

MISSISSIPPI WILDCAT FAILURES

Claiborne County: Robert Oil Co.-Lyle Cashion Co., 15-11n-23, dry, TD 6,514 ft.

Perry County: Hunt & Whitaker Oil Co. 1 U.S.D.A., 18-1n-11w, dry, TD 9,503 ft.

Wilkinson County: N. G. Germany-Austin Stewart Drilling Co. 1 Crosby Lumber & Manufacturing Co., 44-5n-1w, dry, TD 7,012 ft.

Michigan

Offset to Pool Opener Has Traverse Show

MOUNT PLEASANT.—Kisner & Laue were testing a Traverse oil pay at their 1 Younts, SE SE SE 29-4n-13w, Salem Township, Allegan County, direct north 10-acre offset to their Worst estate discovery, opener of Rabbit River shallow Traverse pool. The hole was reported to be showing about 700 ft. of free oil and some water, natural, at 1,655 ft., total depth. Top of objective limestone was picked at 1,650 ft., and oil pay started at 3 ft. in the section. The only other follow-up to the Rabbit River discovery to be completed in the Traverse was a well drilled by Norman L. Stevens ½ mile to the north as a small producer which will probably go into the records as an extension.

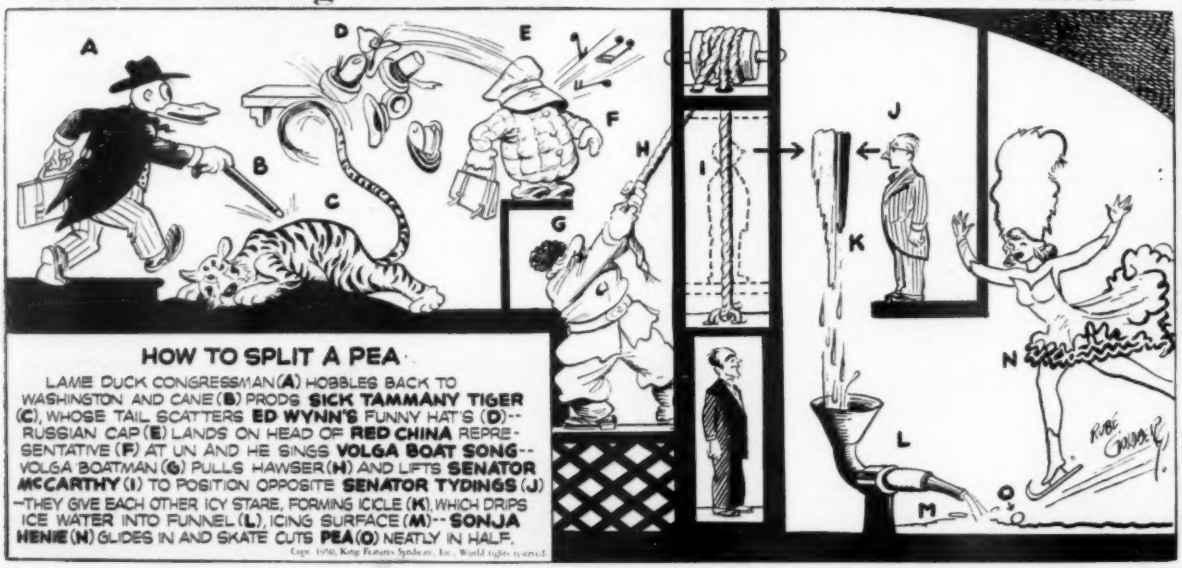
Up to November 17, the Geological Survey Division, Michigan Department of Conservation, had issued a total of 827 drilling permits. Of this total, 330 were rated as exploratory tests and the balance were classified as field developments. During the same period in 1949, the Department had written 916 permits, of which only 289 were wildcats.

Daily average production for September from 3,682 wells was 41,925 bbl. In August, daily average production was 43,633 bbl. from 3,688 producers. Alarm has been sounded in almost all quarters in Michigan that daily oil runs would fall to 40,000 bbl. or less, unless new reserves were discovered soon. Although the currently reported drop was not viewed as a sudden decline, it did appear to confirm this trend of a decrease in production. There has not been a good "reserve-building" discovery since 1948 in Michigan.

MICHIGAN WILDCAT FAILURES

Barry County, Hope Township: C. W. Collin

Rube Goldberg Views the News for His Latest Invention



HOW TO SPLIT A PEA

LAME DUCK CONGRESSMAN (A) HOBBLES BACK TO WASHINGTON AND CANE (B) PRODS **SICK TAMMANY TIGER** (C), WHOSE TAIL SCATTERS **ED WYNN'S** FUNNY HAT'S (D)--RUSSIAN CAP (E) LANDS ON HEAD OF **RED CHINA** REPRESENTATIVE (F) AT UN AND HE SINGS **VOLGA BOAT SONG**--VOLGA BOATMAN (G) PULLS HAWSER (H) AND LIFTS **SENATOR McCARTHY** (I) TO POSITION OPPOSITE **SENATOR TYDINGS** (J) --THEY GIVE EACH OTHER ICY STARE, FORMING ICICLE (K), WHICH DRIPS ICE WATER INTO FUNNEL (L), ICING SURFACE (M)-- **SONJA HENIE** (N) GLIDES IN AND SKATE CUTS **PEA** (O) NEATLY IN HALF.

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and Mercer Oil Co., Inc. 1 Bliss, NE NW SW 8-2n-9w, Traverse 1,853 ft., dry, TD 1,893 ft.

Kalkaska County, Clearwater Township: John Neyer 1 State-Clearwater, SW SW SE 27-27n-5w, dry in Richfield, TD 4,500 ft.

Mecosta County, Morton Township: Mercer Oil Co., Inc. 1 Norman, NE SW SE 21-14n-8w, Dundee 3,559 ft., dry, TD 3,646 ft.

Muskegon County, White River Township: Kenneth A. Fox 1 Rahbein, NW NW NW 23-12n-18w, Traverse 1,665 ft., dry, TD 1,679 ft.

Oceana County, Benona Township: Swan-King Oil Co. 1 Graham, NE SW SW 22-14n-18w, Traverse 1,709 ft., dry, TD 1,740 ft.

Van Buren County, Bloomingdale Township: Granville C. Berlin 1 Fry, SW SW NE 30-1s-14w, Traverse 1,292 ft., dry, TD 1,307 ft.

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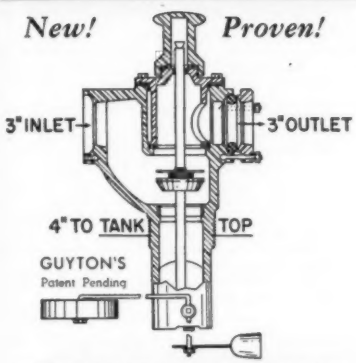

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North Central Texas

Seaboard Oil Co. Opens New Area

WICHITA FALLS.—Seaboard Oil Co. of Delaware prepared to complete its 1 W. F. Edwards, southwest Stonewall County wildcat, as a Pennsylvanian discovery. The well yielded 10 bbl. of clean oil an hour from pay at 5,218-5,338 ft., on the swab. Acid treatment of the section did not increase the recovery. It was drilled ahead and drill-stem tested from 5,338-76 ft. for 3 hours, recovering 990 ft. of clean oil and 5,338 ft. of salt water. Operators planned to plug off the water and complete from open hole between bottom of pipe at 5,218 ft. and 5,338 ft. A previous test from 5,215-5,336 ft. recovered 1,700 ft. of drilling mud and 3,375 ft. of clean oil, with no water, in 2 hours and 45 minutes.

Knox County's first Palo Pinto producer was completed at Stanolind Oil & Gas Co. 1 Icelena Clonts, 5 miles northeast of Knox City. Potential was 129.72 bbl. of 38°-gravity oil a day, flowing through 11/64-in. choke from pay at 4,175-4,220 ft. Flowing tubing pressure was 125 psi. Stanolind was reported to hold some 17,000 acres around the wildcat.

C. U. Bay 1 R. S. Thompson, 4½ miles southwest of Henrietta, recovered oil on two drill-stem tests, one being just above top of the Mississippian and the other in that formation, which was topped at 5,930 ft. First test from 5,865-74 ft. had gas in 39 minutes and recovered 130 ft. of clean oil, plus 10 ft. of mud. Second test, from 5,930-44 ft. recovered 3,400 ft. of gas and 20 ft. of slightly oil-cut mud, with some free oil on top. A final test from 5,954-54 ft., open 2½ hours, had gas in 4½ minutes but did not flow. When drill pipe was pulled the well unloaded oil, and made a recovery of 630 ft. of free oil, with no water.

S. D. Johnson 3 Wines, located 3 miles southwest of Halsell and separated from nearest Caddo production by dry holes. Top of the Caddo was 5,412 ft., which was drilled to 5,494 ft. First test was from 5,445-54 ft. Recovery was 240 ft. of free oil. Second test, from 5,454-64 ft., had gas in 90 minutes and recovered 50 ft. of clean oil plus 30 ft. of heavily oil-cut mud. Operators were drilling ahead below 5,660 ft. Last reported test, in an unidentified formation from 5,644-54 ft., recovered 25 ft. of slightly oil and gas-cut mud.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Fisher County: British American Oil Producing Co. 1 G. W. Stuart, 8-20-T&P, 3½ mi. NW Eskota, TD 6,098 ft., elev. 2,113 ft., Strawn 5,607 ft., perforated 5,608-28 ft., IP 30 bbl. 41°-gravity oil.

Jack County: Robert S. Lytle 1 W. B. Stephens, J. D. Goodman Sur., A-231, 10 mi. NE Jacksboro, TD 5,475 ft., elev. 952 ft., Caddo 4,770 ft., conglomerate 5,048 ft., perforated 5,080-84 ft., IP flowed 140 bbl. 42°-gravity oil in 14 hr., 15/64-in. choke, GOR 600 cu. ft., CP 725 psi., TP 400 psi.

Stephens County: G. E. Kadane & Sons 1 Black, Sec. 62, BAL Sur., 12 mi. W Breckenridge, TD 4,409 ft., PB 3,610 ft., perforated Caddo 3,524-27 ft., IP flowed 95 bbl. 41°-gravity oil a day, 28/64-in. choke, GOR 4,800 cu. ft., CP 505 psi., TP 450 psi.

Throckmorton County: Cities Service Oil Co. 1 Swenson, Sec. 170, BBB&C Sur., A-1121, 9 mi. NW Throckmorton, TD 5,734 ft., elev. 1,510 ft., Caddo 4,727 ft., perforated 4,903-12 ft., IP flowed 217 bbl. 42°-gravity oil in 8 hr., 26/64-in. choke, GOR 598 cu. ft., TP 310 psi.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: G. E. Kadane & Sons 2

(Continued on page 128)

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REPRESSURING WITH GAS OR WATER

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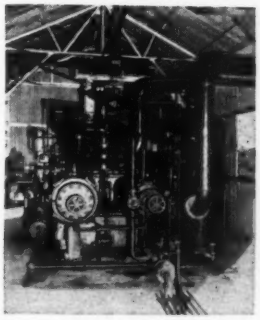

Carter County, Oklahoma

SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION

PETROLEUM ENGINEERS
CABLE & STINE
WICHITA FALLS, TEXAS

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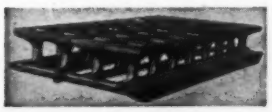

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Eastern Texas

Activity Increases in Grayson County

DALLAS.—In southwest Grayson County, A. R. Dillard staked location for his 1 W. B. McMillan, W. P. B. Duboise Survey, about 14 miles southeast of Sandusky. Proposed depth on the wildcat was 7,500 ft., or to the Pennsylvanian.

Two extension tests were scheduled in East Sandusky Oil Creek sand field. Howell & Howell, and Walter Duncan staked location for their 1 Jones, 2 miles east of the town of Sandusky, and southeast of the field discovery, in the P. C. Parr Survey. The same operators' 2 Jones was located 933 ft. east of the 1 Jones. Contract depth on each was 7,300 ft.

One mile west of the Oil Creek discovery, Texas Co. 1 Winchester, recovered 10 ft. of mud on drill-stem test in limestone, from 7,673-92 ft. Drilling continued below 7,796 ft. in shale and lime.

Texas Co. was assured of a Pettit limestone discovery at its 1 M. T. Holmes, Anderson County wildcat northeast of production in Tennessee Colony field. After drilling to 10,090 ft., production string was cemented at 9,925 ft. and perforated in the Pettit from 9,611-20 ft. and 9,631-42 ft. Following acid treatment the well flowed an average of 10 bbl. of oil an hour, through ⅛-in. choke.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Bowie County: W. M. Coats 1 Gibbons, R. H. King Sur., 1 mi. SE Carbondale, dry, TD 4,310 ft.

Falls County: Ace Oil Co. 1 I. Harrison, Jose Manchaca Sur., 2½ mi. SE Chilton, dry, TD 1,148 ft.

Grayson County: A. R. McElreath and Gaylord H. Chizum, 1 H. Wilson, Alexander Morrison Sur., ¾ mi. NE Pottsboro, dry, TD 4,004 ft.

Hill County: W. P. Smith 1 J. Leon Acton, A. F. McCracken Sur., ½ mi. NW Osceola, dry, TD 1,414 ft.

Hunt County: Mack Hays 1 Bettie Tilson, J. P. Sweeney Sur., 4 mi. NW Campbell, dry, TD 4,470 ft.

Kaufman County: E. A. Ellison 1 E. L. Williamson, E. Higdon Sur., 3 mi. S Kemp, dry, TD 4,631 ft., Paluxy 4,374 ft., Glen Rose 4,594 ft.

Lamar County: Henderson Drilling Co. 1 J. E. Crowley, A. Hampton Sur., 9 mi. S Paris, dry, TD 3,638 ft.

Shelby County: W. H. Neel 1 Eddie DeFrien, J. P. Davis Sur., 2½ mi. SW Joaquin, dry, TD 6,407 ft.

Red River County: Goss Drilling Co. 1 Stephen Rumore, Edward Dean Sur., 3 mi. SE Detroit, dry, TD 1,775 ft. in Paluxy.

Titus County: W. B. Hinton and Magnolia Petroleum Co. 1 Hoffman-Beall-Chamness, M. V. Delgado Sur., 3 mi. SE Talco, dry, TD 9,604 ft.

Louisiana-Arkansas

North Louisiana Reports Four Prospective Strikes

SHREVEPORT.—Hunt Oil Co. and Gulf Refining Co. were credited with two discoveries during the week. The team's 4 Metropolitan Museum of Arts et al. had indicated production at 6,614-18 ft. Location is in Section 5-3n-7e, Concordia Parish. Total depth is 8,006 ft., and operator is running production string to test the 4-ft. possible pay sand.

Hunt and Gulf had another prospective pool opener in Catahoula Parish at their 27 Louisiana Delta Hardwood Lumber Co. et al. The well, in 27-4n-5e, gaged 200 bbl. of oil per day from Wilcox at 5,895-99 ft. Total depth is 7,511 ft.

In Tensas Parish, D. M. Lide Co. 1 Jacoby, 1-12n-12e, ran drill-stem test at 8,790-8,810 ft., and recovered 1,800 ft. of 52.5°-gravity distillate and 90 ft. of distillate-cut mud.

Another Concordia strike was being block squeezed. Sinclair Oil & Gas Co. set 7-in. casing at 7,023 ft. in its 1 Sharp, 10-4n-9e. The test is reported to have found 81 ft. of pay throughout 11 sections of Wilcox.

In Columbia County, Arkansas, E. G. Bradham 1 Huffman cored oil odor but lost it when a drill-stem test of the section recovered 600 bbl. of salt water. Drilling is continuing below 8,200 ft. in the wildcat which is spotted in 6-17s-21w.

NORTH LOUISIANA WILDCAT FAILURES

Caddo Parish: Skelly Oil Co. 1 R. B. Williamson, 9-19n-16w, dry, TD 8,389 ft., elev. 204 ft., Cotton Valley "A" zone 7,754-78 ft., "B" 7,850 ft., "D" 7,932 ft., Davis 8,186 ft.

Catahoula Parish: Placid Oil Co. 1 W. T. Farrier, 29-4n-6e, dry, TD 7,505 ft., Vicksburg 2,488 ft., Cockfield 2,887 ft., Sparta 3,733 ft., Wilcox 4,761 ft.

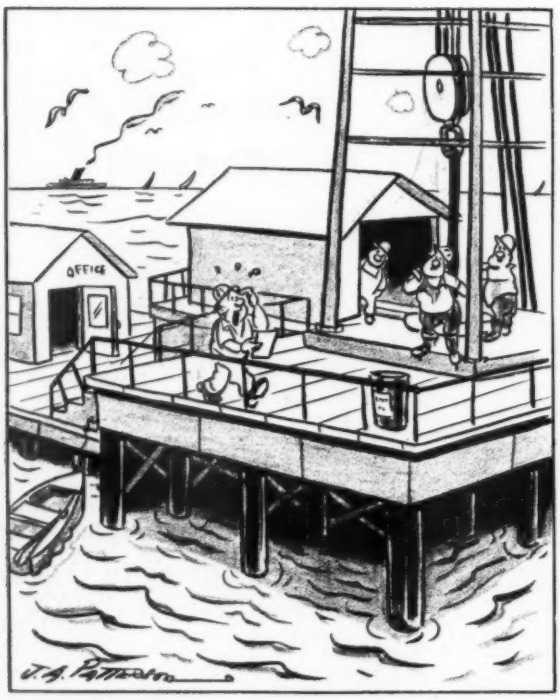
Concordia Parish: D. E. Vasser Drilling Co. 1 Walker, 15-8n-8e, dry, TD 6,015 ft., elev. 63 ft., Wilcox 3,540 ft.

ARKANSAS WILDCAT FAILURES

Columbia County: Arkoma Oil Co. 1 W. A. Boyd, 24-16s-21w, dry, TD 7,670 ft., elev. 352 ft., Arkadelphia 1,655 ft., Nacatoch 1,785 ft., anhydrite 3,322 ft., James 4,055 ft., Travis Peak 4,395 ft., Cotton Valley 5,625 ft., Buckner 7,310 ft., Smackover 7,562 ft.

Hempstead County: Arkoma Oil Co. 1 Mathews, 8-13s-23w, dry, TD 3,500 ft.

Ouachita County: Ormond Corp. 1 Cook est., 16-15s-18w, dry, TD 2,480 ft.



THE OIL AND GAS JOURNAL

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Oklahoma

South Ceres Link Test Shows for Production

THE rapidly narrowing gap between the north end of the South Ceres pool and southwest end of the Northeast Longview pool in Noble County is being closed a little tighter. B. B. Blair 1 Wentz Estate, SE NW SE 31-24n-1e, ¼ mile southwest of production in the latter pool and ¾ mile northeast of the present north tip of the former, found good saturation in the Bartlesville sand pay of these pools and has casing run for completion test. The sand was topped at 4,322 ft. and cored to 4,389 ft., present depth.

Another intermediate location in the long, narrow line of production at the upper end of the South Ceres pool is being proved by Deep Rock Oil Corp. 2 McCormick, NE SW SE 1-23n-1w, which flowed 63 bbl. of clean oil the first hour through ¾-in. choke. Flow the second hour was gaged at 51 bbl., and the third hour at 39 bbl. Total depth in the Bartlesville pay is 4,495 ft.

Productive area of rapidly developing East Springs pool in Lincoln County continues to spread with both Blackwell Oil & Gas Co. and Allied Materials Co. completing wells at eastward step-out locations. Allied Materials 1 Wright, SW SE NE 9-13n-5e, one of the step-out wells, flowed 71 bbl. of oil in 5 hours through ½-in. choke while testing from open hole at 3,470-3,507 ft. in the pool's Prue sand pay zone. Blackwell Oil & Gas Co.'s new well, also 1 Wright, is a south offset to the Allied well, its location being in the NW NE SE 9-13n-5e. It logged the Prue sand at 3,480-88 ft. Hole was drilled to 3,500 ft. and casing run to the top of the pay.

Stanolind Oil & Gas Co. has another northward extension for the North Milroy pool, Stephens County, at its 1 Eason, NE SE SE 2-2s-4w. The well flowed at the rate of approximately 350 bbl. of 35° oil daily from the pool's Springer sand pay zone, in which casing was perforated at 6,650-6,725 ft. Hole had been drilled to 6,791 ft. and plugged back to 6,736 ft.

New development in the area just west of the Fox townsite, Carter County, is being given a boost by prospects of an exceptionally good well at Bay Petroleum Corp. 2 Carpenter, SW SW SE 15-2s-3w. In a drillstem test of sand at 4,456-4,504 ft. the well flowed at an estimated rate of 100 bbl. of oil per hour for the final 14 minutes of the test.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Deep Rock Oil Corp. 1 Kahn-Hamilton, SE SE SE 11-3n-2w, extension to NE Antioch, flowed 480 bbl. oil per day from second bromide at 5,635-63 ft., TD 5,735 ft., elev. 918 ft., Elgin 3,510 ft., sand 3,805 ft. and 4,157 ft., Belle City lime 4,670 ft., Hogshooter 4,780 ft., Checkerboard 5,164 ft., Deese 5,228 ft., Viola 5,274 ft., bromide dense 5,428 ft., second sand 5,356 ft.

Lincoln County: Wilcox Oil 1 Potter, SW SW SE 21-16n-3e, flowed 7,000,000 cu. ft. gas from Hunton at 4,670-80 ft., TD 5,004 ft., Hogshooter 3,160 ft., Checkerboard 3,430 ft., Oswego 3,961 ft., Verdigris 4,128 ft., lime 4,278 ft., Red Fork-Bartlesville sand 4,296 ft., lime 4,509 ft., Mississippi lime 4,563 ft., Woodford 4,684 ft., Hunton 3,726 ft., Sylvan 4,782 ft., Viola 4,874 ft., first Wilcox 4,940 ft., second Wilcox 4,996 ft.

Okfuskee County: Mid-Continent 1 Scott, NW SE NE 29-10n-10e, elev. 904 ft., flowed 41,700,000 cu. ft. gas from Hunton at 3,870-90 ft., TD 4,254 ft., Bartlesville 2,167 ft., Gilcrease 2,820 ft., Wapanucka 3,137 ft., Union Valley 3,351 ft., Cromwell 3,410 ft., Sylvan 3,996 ft., Viola 4,082 ft., second Wilcox 4,177 ft.

Oklahoma County: Harper-Turner 1 Delay, SW SW SW 2-14n-2w, elev. 1,058 ft., flowed 74 bbl. 38°-gravity oil per day from second Wilcox at 5,143-47 ft., TD 6,155 ft., Hogshooter 4,647 ft., Checkerboard 4,920 ft., conglomerate 5,330 ft., Big lime 5,370 ft., Oswego 5,802 ft., Viola 5,905 ft., Marshall 6,072 ft., sandy dolomite 6,138 ft.

Pontotoc County: Bouse & Showalter 1 Larmour, NW SW NW 16-4n-5e, elev. 1,009 ft., flowed 4,830,000 cu. ft. gas per day from conglomerate 874-99 ft., TD.

OKLAHOMA WILDCAT FAILURES

Carter County: Phillips et al 2 Minnette, NW SW NE 3-1s-3w, est. elev. 1,005 ft., dry, TD 5,363 ft., Deese 2,290 ft., lower Dornick Hills 2,700 ft., Springer 3,380 ft., Aldridge 3,660 ft., upper Simpson 4,902 ft., base upper Simpson 5,044 ft., lower Simpson 5,076 ft.

(Continued on page 128)

For Sale

22,000 Acres of Mineral Reserves

DeBardeleben Coal Corporation is offering for sale approximately 22,000 acres of mineral rights and 1,400 acres in fee simple, lying in Walker and Cullman Counties, Alabama. For further information, maps and detailed description of property, contact Walter S. Patton, Land Agent, DeBardeleben Coal Corporation, Sipsey, Ala. Phone 3-9929 (Birmingham, Ala.)

Ohio Fields

Midland Oil Brings in Good Oil Producer

COLUMBUS.—Midland Oil Co. 3 John Rodman, Section 3, Bowling Green Township, Licking County, found Clinton at 2,993-3,034 ft. with a good showing of oil, natural, and 110 bbl. in 24 hours after shot.

Hipp Lumber Co. 2 Mary Jergens, Section 1, Jefferson Township, Knox County, showed some oil, natural, and made 35 bbl. the first day after shot. Wray Drilling Co. 1 Waldo Blue, Section 9, Jackson Township, had only a small oil showing, natural, and made 20 bbl. in 24 hours after shot from Clinton at 3,077-3,122 ft.

Ditch & Gerig completed another Newburg well in the east part of Congress Township, Wayne County. On Erwin Hovorka, Section 24, the sand came in at 2,500-83 ft. with 500,000 cu. ft. of gas, natural.

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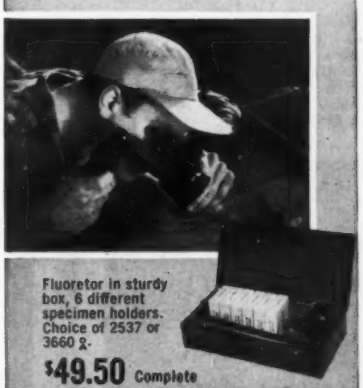

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Kansas

Good Producer Indicated In Scott County Wildcat

HERNDON DRILLING CO. 1 Rueter, NE NE NE 25-18-32, a rank wildcat located 5 miles southeast of Scott City, in Scott County, in the western part of the state, swabbed and flowed more than 200 bbl. of clean oil during a 7-hour period in production tests of previously reported showings found in the Lansing section. Casing, run through the promising pay zone, topped at 4,646 ft. (—4,540 ft.), was perforated at 4,000-08 ft. Bottom of the casing is 4,373 ft. with hole plugged back from a former total depth of 4,646 ft. in the Mississippian topped at 4,540 ft.

Location of the discovery is about 15 miles northeast of the comparatively small Shallow Water pool, one of the few scattered pools in that part of the state. It is 20 miles north of the northernmost limits of the Hugoton gas field. The general area has been only sparsely exploited.

Carter Oil Co. has made another promising discovery in Wabaunsee County, in the Forest City Basin, in the northeastern part of the state. Its 1 Woodbury, SE SW NE 11-15-10e, in the extreme southern part of the county near the Lyon County line, had 310 ft. of heavy oil and an additional 45 ft. of heavily oil-cut mud in the pipe following a 2-hour drill-stem test of showings encountered in the Simpson section. If production is established, it will be the first from that formation in the northeastern and eastern part of the state. So far, deepest production, stratigraphically, in that general region has been from Viola lime. The well topped the Decorah (Simpson equivalent in that part of the state) at 3,262 ft. (—1,845 ft.). The St. Peter (Simpson sand) zone was topped at 3,289 ft. and drilled to 3,293 ft. (total depth). The drill-stem test embraced an interval at 3,277-93 ft. Following the test, 7-in. casing was cemented at 3,286 ft. The well previously had shown for possible production in Viola lime, topped at 3,183 ft. (—1,766 ft.), and in which a 2-hour drill-stem test at 3,184-88 ft. got 580 ft. of oil with 360 ft. of salty water. The location is about 8 miles south of the Davis Ranch pool, discovered in 1949 by Carter, and where good Viola lime production has been developed.

In the southwestern part of the state, Columbian Carbon Co. and Associates have made a promising oil discovery in their 1 Novinger, C NW NW 26-33-30, Meade County. Good oil showings were found in the Marmaton (Pennsylvanian) formation. In a 68-minute drill-stem test of an interval at 5,269-79 ft., 500 ft. of clean oil and 100 ft. of muddy oil was recovered. Flowing pressure during the test was 1,175 psi. Indicated bottom-hole pressure was 1,700 psi. Additional cores are being taken.

Nearest production of any kind is in the East Adams Ranch gas pool, 5 miles to the southeast. Nearest oil production is in the Kismet pool, 6 miles to the west, in Seward County.

KANSAS SUCCESSFUL WILDCATS

Barton County: Branine & Holl 1 Roesler, NW NW NW 13-18s-11w, elev. 1,780 ft., 220 bbl. oil per day from Arbuckle at 3,295-98 ft., TD anhydrite 570 ft., Heebner 2,883 ft., lime 3,001 ft., Lansing-Kansas City 3,018 ft.

Ellis County: Brack 1 Ruder, NW NW NE 31-14s-18w, elev. 2,042 ft., pumped 21 bbl. oil per day from Arbuckle at 3,629-36 ft., TD; anhydrite 1,260 ft., Lansing-Kansas Citq 3,343 ft.

Phillips County: Stableford 1 Essert, NE NE SE 36-1s-19w, extensions to Huffsturrer, elev. 2,220 ft., pumped 128 bbl.

(Continued on page 127)

Illinois-Ind.-Ky.

New Production Proved At Rural Hill Outposts

NEW production is being proved at three different outpost locations in the Rural Hill area of Hamilton County, Illinois. About 1½ miles to the east of the town and about ¼ mile east of production at the north end of South Rural Hill pool and about ½ mile south of production of main Rural Hill pool, Dale Hopkins has completed his 1 Moore, NW SW SW 25-6s-5e, pumping 240 bbl. of oil daily from Aux Vases sand at 3,179-87 ft. A north offset, 1 Lee Community, SW NW SW 25-6s-5e, is being put on the pump after swabbing tests in which it produced at rates up to 500 bbl. per day from the same pay at 3,157-64 ft. A west offset, 2 Burnett-Johnson, SE NE SE 26-6s-5e, is preparing to test the zone at 3,166-78 ft. after running casing.

About 1¾ miles to the northwest of the Hopkins discovery, Stewart Oil Co. is cleaning out to test its 1 Foster, NE SW SW 22-6s-5e, which got a good oil flow in drill-stem tests of the Aux Vases at 3,178-90 ft. and 3,192-3,209 ft.

About a mile southwest of the Stewart well, Phillips Petroleum Co. 1 Avery, SW NW NW 28-6s-5e, pumped 156 bbl. of oil per day from Aux Vases sand at 3,214-37 ft. This discovery is being confirmed with a second well, 2 Avery, SE NW NW 28, which also found good saturation in the same zone at 3,238-62 ft.

ILLINOIS SUCCESSFUL WILDCAT

Clay County: George & Wrather 1 Little, NE SE SE 18-4n-8e, IP 3 bbl., McClosky 2,992-3,002 ft., TD 3,045 ft. (opens new pay).

ILLINOIS WILDCAT FAILURES

Clay County: T. S. Doran et al., 1 Crews Heirs, SW SE NW 4-4n-5e, dry, TD 2,691 ft.

Clinton County: Ryan Oil Co. 1 Belcher, SE NW SW 24-3n-1w, dry, TD 2,970 ft.

Edwards County: George & Wrather Knackmus-Witte, SE SW SE 10-1n-14w, dry, TD 3,051 ft.

W. R. Ransome 1 Saxe-Gill Community, NW SE SW 16-1s-10e, dry, TD 3,332 ft.

Fayette County: R. H. Troop 1 Evans, NW NW SE 25-6n-1w, dry, TD 1,673 ft.

Joe Reznik 1 Williams, SE SW NW 14-5n-1w, dry, TD 1,568 ft.

Columbus Exploration Co. 1 Heingmann, NW NE SW 14-4n-1w, dry, TD 1,507 ft.

Franklin County: R. L. Rea 1 Jobe, NE SW SE 20-7s-4e, dry, TD 3,250 ft.

Gallatin County: Calstar Petroleum Co. 1 Greene, NW SW SW 36-7s-9e, dry, TD 3,015 ft.

Jefferson County: Russell Cobb, Jr., 1 Pigg, NE NW NW 14-3s-2e, dry, TD 2,893 ft.

McDonough County: F. A. Shaeffer 1 Morrow, SE SE SW 31-5n-4w, dry, TD 835 ft.

Montgomery County: B. F. Williams 1 Greenleaf, SE NE SW 21-7n-3w, dry, TD 971 ft.

Moutrie County: E. H. Kaufman 1 Welsh, NW NW NW 31-15n-4e, dry, TD 1,740 ft.

Perry County: The Texas Co. 1 Restoff, NW SE SE 13-4s-1w, dry, TD 2,542 ft.

Shelby County: J. W. McGuire 1 Fonting, NW NE NW 28-13n-2e, dry, TD 2,675 ft.

Vermillion County: L. Leyh 2 Allison, C E½ NW SE 8-21n-11w, dry, TD 1,289 ft.

INDIANA WILDCAT FAILURE

Spencer County: Joe Reznik 1 Talbot Community, NW SE NW 4-6s-4w, dry, TD 1,431 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Daviess County: F. Haynes and Gus Morgan 2 Benningfield, 20-P-32, IP 5 bbl., McClosky 1,060-65 ft., TD 1,065 ft. (opens new pool).

WESTERN KENTUCKY WILDCAT FAILURE

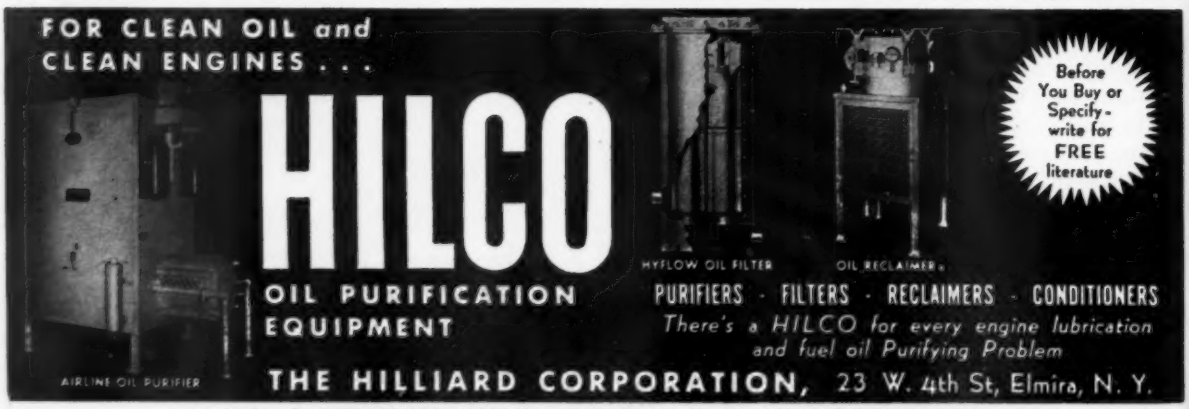
Hancock County: O. L. Sturbois 1 Coney, SW NW SE 1-P-34, dry, TD 400 ft.

EASTERN KENTUCKY

ASHLAND.—In Greenup County, 3-Y-79, the test of Dixie King Coal Co. on Wain Boggs tract, is drilling ahead at 367 ft. and expecting top of Berea shortly. The well is the only wildcat drilling in the county at the present time.

In Ida May pool of southern Lee County two small producers have recently been completed by Duck Fork Oil Co. 1 Dave Mays made 1 bbl. of oil daily at total depth of 1,113 ft. in the Corniferous lime and 2 Dave Mays made 2 bbl. daily at total depth og 1,109 ft. in the same formation.

In Martin County and located on Wolf Creek in Big Sandy gas field, Conrad Kirk has completed 1 T. J. Hardin in the Big lime at a total depth of 1,460 ft. It gaged 980,000 cu. ft. of gas daily with a rock pressure of 500 psi. in 48 hours.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Figures for Ten Months Indicate Fulfillment of Year's Forecast

by Polly DeArmond

AN analysis of 10-month figures indicates that operators are assured of accomplishing their revised record program of 43,084 wells and 159,309,000 ft. for the entire year, as reported in The Oil and Gas Journal's Midyear issue of July 27, 1950.

So far this year 35,783 wells have been drilled with total footage of 130,466,406 ft. These figures represent gains of 11 per cent in completions and 13.9 per cent in footage over the preceding year which holds the all-time footage record. The all-time high in completions was set in 1948, and tabulations for January through October exceed 1948's 10-month figures by 9.4 per cent in wells and 15.9 per cent in footage. Comparisons with the previous peak years follow in detail below.

1950 vs. 1949

The greatest gains for the period of 1950 over 1949 occurred in the Mid-Continent section. Oklahoma-Kansas-Nebraska jumped 1,631 wells, or 25.9 per cent, and 5,666,054 ft., or 26.6 per cent. Texas and New Mexico gained 2,390 completions or 20.5 per cent, and 11,418,391 ft., or 23 per cent. Lesser increases were recorded in the north-central and southern states, and deeper drilling was noted in the southern and western areas. Ohio, Kentucky, Illinois, Indiana, and Michigan were up 480 wells (8.1 per cent), and 414,691 ft. (3.3 per cent) over 1949. Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, and Tennessee reported gains of 128 completions (5 per cent) with 1,550,557 additional ft. drilled (11.3 per cent). While Montana, Wyoming, Colorado, Utah, and the Dakotas decreased 21 wells, or 2.5 per cent, this group increased some 15,600 ft., less than 1 per cent.

California showed the largest losses: down 696 wells, or 32.2 per cent, and off 2,631,584 ft., or 29.2 per cent, for the comparative period. The eastern area was also down from last year, decreasing 362 completions (12.9 per cent) and 472,674 ft. (9.4 per cent).

1950 vs. 1948

Ten-month comparisons with 1948 figures show that the middle U. S. gained in both wells and footage, while the eastern and western regions declined in both categories.

Texas and New Mexico paced the increased activity with 3,637 more wells, a gain of 34.9 per cent, and an accompanying increase of 16,946,505 ft., or 37.6 per cent. Oklahoma-Kansas-Nebraska reported a gain of 26.9 per cent in both categories, up 1,680 completions and 5,712,242 ft. Ohio et al. increased 837 wells (15.1 per cent) and 291,696 ft. (2.3 per cent). Deeper operations were evident in the southern states, which gained 2,204,117 ft., or 16.9 per cent, with only 25 additional wells, or 0.9 per cent, over 1948.

The Appalachian area dropped 2,032 completions (45.4 per cent) and 3,203,099 ft. (41.4 per cent) from 1948's cumulative statistics. The West Coast fell 959 wells (39.5 per cent) and 2,522,414 ft. (28.3 per cent). The Rocky Mountain section was off 118 completions (12.5 per cent) and 463,525 ft. (12.1 per cent).

SUMMARY OF COMPLETIONS—OCTOBER 1950

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500-ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	54	27	0	27	54	0	0	0	0	0	78,000	61
Pennsylvania	155	73	23	59	134	20	0	1	0	0	269,120	297
West Virginia	§57	12	29	16	29	24	4	0	0	0	159,718	190
Ohio	100	26	27	47	61	38	1	0	0	0	200,640	156
Kentucky	117	57	8	52	95	22	0	0	0	0	215,643	96
Illinois	272	119	1	152	142	130	0	0	0	0	616,829	314
Indiana	141	48	4	89	118	23	0	0	0	0	251,486	213
Michigan	85	37	6	42	43	42	0	0	0	0	223,026	138
Kansas	397	177	63	157	58	338	1	0	0	0	1,266,113	366
Neb., Mo., Iowa	26	10	3	13	11	11	4	0	0	0	88,436	39
Oklahoma	466	296	10	160	131	219	93	8	14	1	1,763,452	837
Texas	1,324	814	58	452	357	489	340	111	21	6	5,779,597	1,423
North	244	114	2	128	128	84	30	2	0	0	704,271	165
West Central	162	85	6	71	79	68	15	0	0	0	442,275	143
West	399	321	2	76	68	99	183	36	7	6	2,132,897	542
Panhandle	73	43	22	8	3	69	1	0	0	0	228,627	114
East	86	57	2	27	12	48	17	8	1	0	383,688	69
Gulf Coast	194	102	14	78	20	61	54	47	12	0	1,137,797	244
Southwest	166	92	10	64	47	60	40	18	1	0	750,042	146
Louisiana	189	108	18	63	48	33	34	35	32	7	1,153,703	289
Northern	104	50	15	39	47	29	20	6	2	0	374,803	131
Southern	85	58	3	24	1	4	14	29	30	7	778,900	158
Arkansas	22	13	0	9	5	12	3	2	0	0	75,664	52
Mississippi	25	9	1	15	0	1	13	7	4	0	188,989	29
Ala., Ga., Fla.	3	1	0	2	0	2	1	0	0	0	13,318	7
Montana	27	18	2	7	17	8	2	0	0	0	66,867	51
Wyoming	¶55	27	1	27	6	27	9	11	1	1	280,428	152
Colorado	12	3	2	7	5	3	4	0	0	0	38,279	41
Utah	5	0	0	5	2	3	0	0	0	0	14,108	17
New Mexico	44	23	10	11	6	15	5	12	3	3	239,490	‖111
California	154	101	9	44	35	79	24	8	6	2	665,881	211
Dakotas	2	0	0	2	0	0	1	1	0	0	14,589	**9
Total October 1950	3,732	†1,999	275	*1,458	1,357	1,539	539	196	81	20	13,663,376	‡5,099
Total September 1950	3,756	2,031	257	1,468	1,429	1,471	585	185	73	13	13,443,679	4,890
Total October 1949	3,273	1,826	261	1,186	1,395	1,281	384	134	62	17	10,908,011	4,614
Cumulative 1950	35,783	20,187	2,372	13,224	13,196	14,276	5,541	1,842	802	124	130,466,406	....
Cumulative 1949	32,233	18,185	2,369	11,679	12,332	13,149	4,179	1,681	775	117	114,505,278	....

*Incl. 102 service wells: N. Y. 27, Pa., 55, Ohio 8, Ill., 1, Kans. 4, Okla. 4, E. Tex. 1, Tex. Gulf. 1, Ark. 1. †Incl. 43 distillate wells: Okla. 10, W. Tex. 5, E. Tex. 6, Tex. Gulf. 7, S.W. Tex. 4, No. La. 5, So. La. 4, Miss. 2. ‡Incl. all wells rigged up and/or drilling at end of month. §Incl. 1 gas and 2 dry Md. comp. at 13,024 ft. and 2 rigs. ¶Incl. 1 dry Idaho comp. at 5,597 ft. and 2 rigs. ‖Incl. 5 Ariz. rigs. **Incl. 4 Nevada rigs.

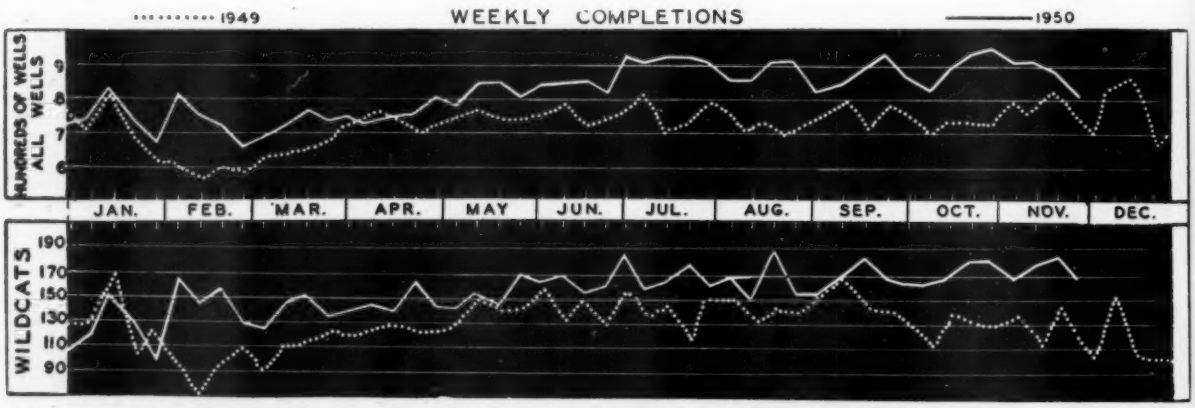
CURRENT STATISTICS

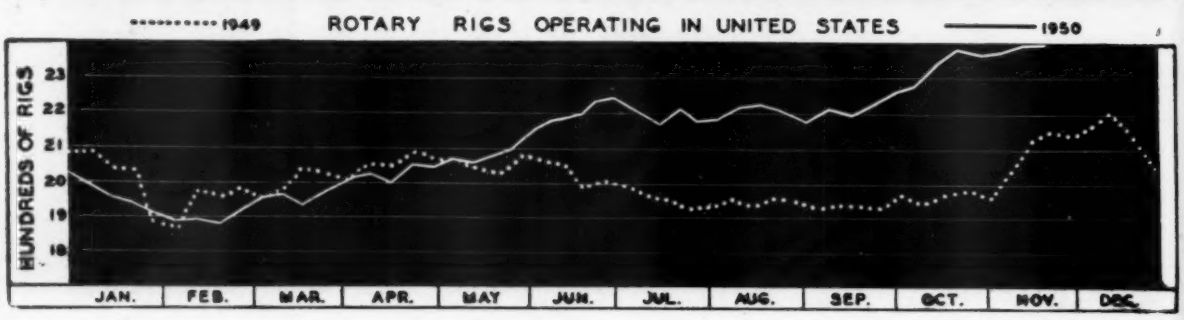
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED NOVEMBER 25, 1950

	Total of all wells							Wildcat completions and discoveries									
						Nov. 25							Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	6	0	*5	16,027	623	861	0	0	0	0	0	0	0	0	0	0
Pennsylvania	23	10	2	†11	38,197	1,232	1,431	0	0	0	0	0	0	0	1	3	4
West Virginia	8	0	6	2	23,661	597	474	0	0	1	0	1	0	0	21	19	40
Ohio	21	7	6	8	43,974	945	1,008	0	0	0	0	0	2	0	2	15	19
Indiana	8	0	1	7	17,373	1,482	1,222	0	0	0	1	1	52	0	2	235	289
Kentucky	15	7	1	7	26,071	1,070	920	1	0	0	1	2	26	0	1	89	116
Illinois	64	22	2	40	154,259	2,587	2,398	1	0	0	16	17	51	0	3	555	609
Michigan	15	4	0	11	38,708	818	927	0	0	0	6	6	33	0	6	279	318
Kansas	80	37	9	*34	248,400	3,537	3,000	4	0	0	10	14	102	0	11	591	704
Nebraska	2	0	0	2	8,012	118	31	0	0	0	2	2	6	0	4	52	62
Oklahoma	112	62	9	‡41	443,460	4,913	3,918	2	0	3	15	20	146	6	18	599	769
Texas	320	194	15	111	1,430,526	14,916	12,150	10	0	1	68	79	466	43	106	2,426	3,041
North Central (Dist. 7-B & 9)	98	54	1	‡43	282,108	4,540	4,038	4	0	0	24	28	203	2	29	949	1,183
West (Dist. 7-C & 8)	75	56	0	19	420,195	4,479	2,972	3	0	0	14	17	90	3	6	484	583
Panhandle (Dist. 10)	16	10	4	2	49,540	819	882	0	0	0	0	0	1	0	2	19	22
Eastern (Dist. 5, 6, & 6-P)	35	19	6	10	161,349	1,049	774	0	0	0	10	10	15	5	3	183	206
Gulf Coast (Dist. 2 & 3)	49	32	2	15	321,193	2,098	1,778	2	0	1	11	14	77	21	41	361	500
Southwest (Dist. 1 & 4)	47	23	2	22	196,141	1,931	1,706	1	0	0	9	10	80	12	25	430	547
Louisiana	40	12	2	26	271,435	2,211	2,142	0	0	0	3	3	47	16	6	201	270
Northern	17	6	1	10	79,449	1,186	1,288	0	0	0	3	3	13	3	2	102	120
Southern	23	6	1	16	191,986	1,025	854	0	0	0	0	0	34	13	4	99	150
Arkansas	11	7	0	‡4	31,609	371	303	0	0	0	3	3	10	0	0	83	93
Mississippi	5	0	0	5	39,917	282	310	0	0	0	3	3	10	2	0	107	119
Southeastern States	0	0	0	0	0	52	43	0	0	0	0	0	1	0	1	28	30
Montana	2	2	0	0	9,713	246	239	1	0	0	0	1	2	0	0	43	45
Wyoming	20	8	0	12	82,325	542	541	0	0	0	6	6	23	0	1	83	107
Colorado-Utah	3	1	0	2	19,638	101	127	1	0	0	2	3	6	0	3	59	68
New Mexico	14	10	4	0	57,298	555	467	0	0	0	0	0	11	1	3	51	66
California	35	26	3	6	141,005	1,621	2,336	2	0	0	6	8	27	0	4	347	378
Miscellaneous	0	0	0	0	0	49	26	0	0	0	0	0	0	0	0	24	24
Total United States	809	415	60	334	3,141,608	38,868	34,874	22	0	5	142	169	1,021	68	193	5,889	7,171
Total previous week	885	493	46	346	3,315,694	....	....	30	3	5	146	184	999	68	188	5,747	7,002
Total November 25, 1949	776	448	61	267	2,752,981	....	....	17	0	2	97	116	852	74	178	5,049	6,153

Service wells included: *5, †10, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 25 crude oil	B. of M. Nov. demand	Nov. 18 crude oil
Alabama	2,350	1,600	2,300
Arkansas	79,400	88,000	81,300
California	955,300	950,000	956,700
Colorado	75,700	67,000	75,200
Eastern	64,250	65,000	66,600
Florida	1,850	1,400	1,825
Illinois	171,800	184,000	171,000
Indiana	29,600	31,000	29,800
Kansas	315,600	306,000	305,100
Kentucky	29,800	30,000	29,900
Louisiana	582,200	606,000	582,100
North Louisiana	114,200	.....	114,100
South Louisiana	468,000	.....	468,000
Michigan	44,700	47,000	41,400
Mississippi	104,800	110,000	104,800
Montana	22,600	24,000	22,300
Nebraska	5,400	5,000	5,400
New Mexico	130,925	150,000	130,925
Oklahoma	491,200	466,000	493,900
Texas	2,535,200	2,350,000	2,535,200
Dist. 1 (Southwest)	31,200	.....	31,200
Dist. 2 (Southwest)	148,725	.....	148,725
Dist. 4 (Southwest)	225,350	.....	225,350
Dist. 3 (Gulf Coast)	443,450	.....	443,450
Dist. 5 (Eastern	42,850	.....	42,850
Dist. 6 (Eastern)	98,050	.....	98,050
East Texas field	291,000	.....	291,000
Dist. 7-C (West)	71,450	.....	71,450
Dist. 8 (West)	871,600	.....	871,600
Dist. 7-B (West Central)	71,875	.....	71,875
Dist. 9 (N. Central)	149,650	.....	149,650
Dist. 10 (Panhandle)	90,000	.....	90,000
Utah	3,200	4,000	3,400
Wyoming	178,200	184,000	177,900
Total United States	*5,824,075	5,670,000	5,817,050
Change from prev. week, up	7,025		
Canada	102,260		100,180

Total U. S. production January 1-November 25 †1,773,402,785 bbl.

Same period last year (crude plus cond.) ..... 1,670,228,980 bbl.

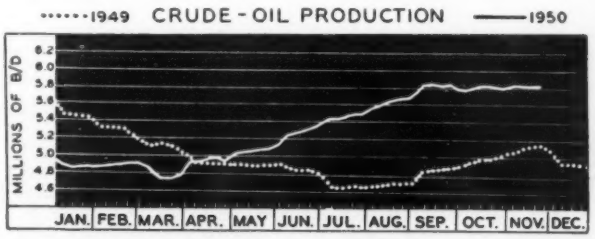
*Not including 100,005 bbl. condensate. †Including 32,104,205 bbl. condensate.

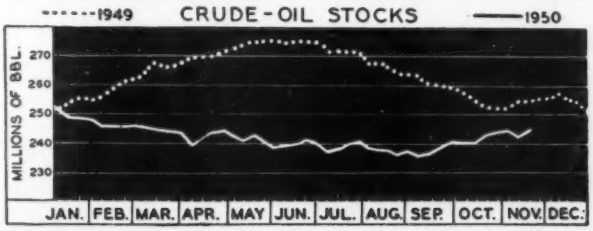
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

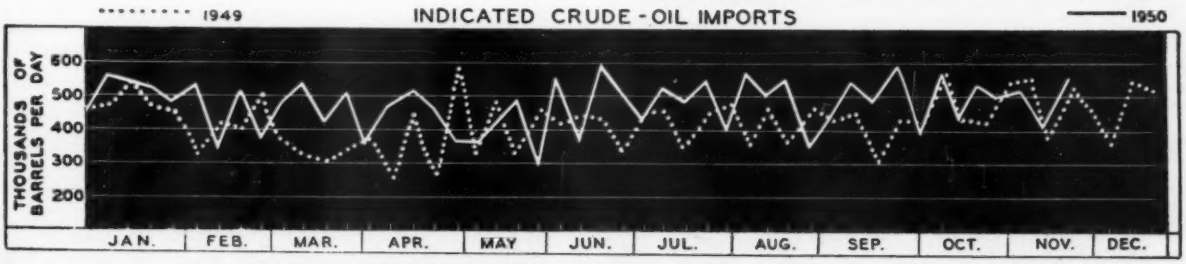
(Thousands of barrels)

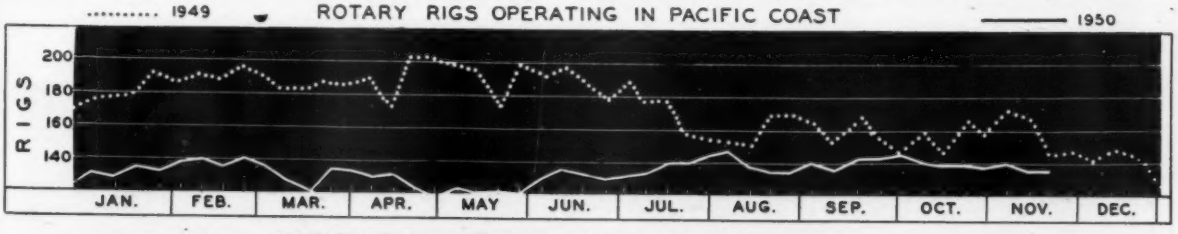
	Nov. 18, 1950	Nov. 11, 1950	Nov. 19, 1949
Pennsylvania Grade	2,255	2,311	3,150
Other Appalachian	1,409	1,298	2,249
Illinois, Indiana, Michigan	10,245	10,128	11,184
Arkansas	2,704	2,453	2,687
Louisiana	14,182	13,481	13,162
North	2,723	2,809	2,913
Gulf	11,459	10,672	10,249
Mississippi	2,056	1,886	2,350
New Mexico	6,844	6,586	7,476
Oklahoma and Kansas	37,731	37,797	37,065
Texas	118,949	118,638	117,365
East Texas	13,744	14,563	17,061
West Texas	45,934	46,491	44,526
Texas Gulf	29,568	29,100	30,038
Other Texas	29,703	28,484	25,740
Rocky Mountain	11,435	11,465	13,976
California	30,641	30,308	37,653
Foreign	6,665	5,888	8,057
Total	245,116	242,239	256,374

*Bureau of Mines.







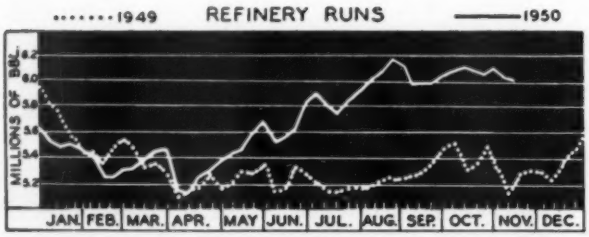


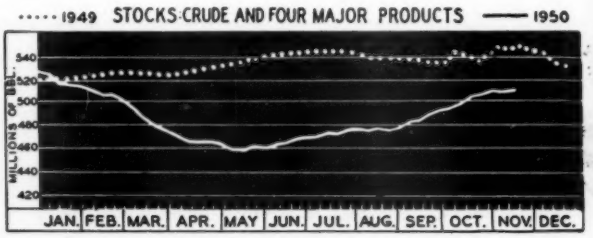
A.P.I. REFINERY REPORT, NOVEMBER 18

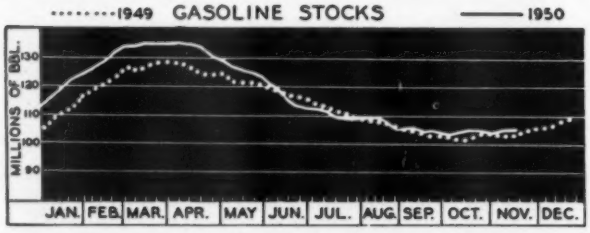
(Thousands of barrels)

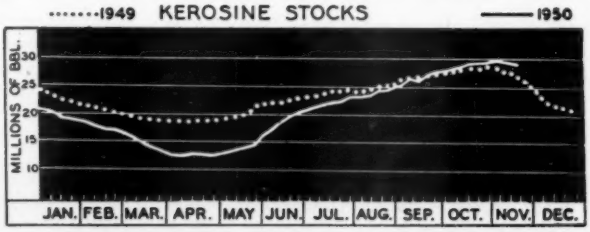
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, November 1949: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	871	314.2	16.4	242.4	206.6	23,751	11,039	28,827	11,445	760	322.0	26.7	158.7	190.4
Appalachian:														
District 1	103	38.0	5.9	12.3	11.4	2,737	451	989	462	92	41.7	5.8	12.4	9.5
District 2	65	36.0	5.1	7.4	16.9	1,111	217	273	169	55	26.5	3.5	5.8	11.0
Ind., Ill., Ky.	1,120	621.0	64.7	174.7	167.0	21,199	6,018	14,584	4,991	932	492.5	62.7	144.7	163.9
Okla., Kans., Mo.	505	279.3	27.6	102.3	63.6	10,673	1,432	9,081	1,335	426	240.7	15.4	87.6	58.9
Inland Texas	207	140.1	9.6	33.6	41.8	3,425	558	1,383	642	207	143.2	12.7	25.6	41.8
Texas Gulf Coast	1,459	652.7	117.2	317.8	264.3	17,215	4,167	13,538	6,409	1,279	615.5	104.0	253.2	250.4
La. Gulf Coast	486	226.3	58.7	100.7	59.1	5,956	2,867	3,924	2,382	443	228.9	53.6	103.6	59.4
N. La. and Ark.	72	30.0	7.7	14.9	8.0	2,342	433	853	168	81	31.9	7.8	11.1	16.2
Rocky Mountain:														
New Mexico	14	7.3	.4	2.9	3.9	89	25	41	29	12	7.0	.4	1.8	3.3
Other Rocky Mtn.	209	91.1	8.6	39.1	44.8	2,750	351	1,981	760	162	76.2	6.5	25.7	32.9
California	891	378.6	9.4	127.8	360.7	14,220	824	11,643	16,494	844	367.8	10.0	132.2	342.7
November 18, 1950	6,002	2,814.6	331.3	1,175.9	1,248.1	105,468	28,382	87,117	45,286	5,293	2,593.9	309.1	962.4	1,180.4
November 11, 1950	6,018	2,780.9	317.1	1,209.4	1,233.7	105,465	29,003	86,721	45,140	.....	.....	.....	.....	.....
November 19, 1949	5,292	2,593.9	318.1	1,016.7	1,173.4	103,380	27,526	92,652	68,620	.....	.....	.....	.....	.....

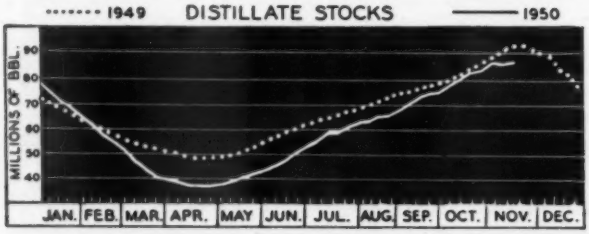
*At refineries including natural blended. †Finished and unfinished.

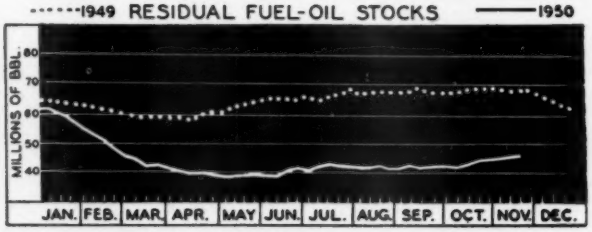


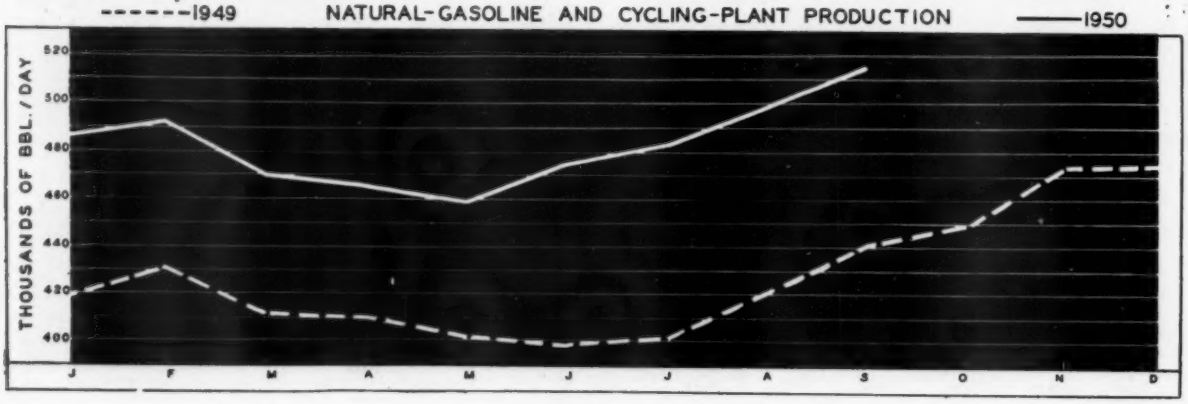












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.76	....	....	....
19-19.9	1.83	....	....	....
20-20.9	1.90	$2.25	....	$2.12
21-21.9	1.97	2.27	....	2.14
22-22.9	2.04	2.29	....	2.16
23-23.9	2.10	2.31	....	2.18
24-24.9	2.17	2.33	$2.56	2.20
25-25.9	2.24	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.10
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

COLDER weather in the important fuel-consuming areas is giving a lift to light and heavy-fuel markets. The size of distillate movement in the early part of November indicated that resellers and jobbers were keeping their own tanks full but that refill orders from consumers were somewhat behind schedule.

High distillate demands in the early summer months resulted from intense consumer buying for storage. Since most consumer tanks were full at the beginning of the heating season, distillate sales in October, for the most part, went to customers with low storage-consumption ratios.

Suppliers in the Mid-Continent reported a big increase in shipping instructions for both No. 2 and No. 1 by the end of last week. Some shortage of cars was reported, but the big rush was probably due to shipping instructions from resellers who wanted to keep their tanks filled. The third November cold wave came at a time when many consumer tanks were low enough for a refill, and most marketers feel that this is the opening of the winter-demand season.

Changes in fuel prices on the Group 3 market were confined to increases for lower-quality distillates. Some dark No. 2 that had been moving at the low or just under low moved up into the range for No. 2 straw.

Fuel movement to consumers in the North Atlantic states was disrupted by the storm, but the increase in demand is expected to reduce reseller stocks. As soon as this is reflected in a drop in primary stocks on the East Coast, the increased movement from the Gulf Coast will require some adjustment in prices to give a more normal differential between Gulf Coast and East Coast postings and to correct for increased tanker rates.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of November 27, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13-13.75	11½-12
42-44 w.w. kerosine	8⅞-9⅛	10-10.1	8½-9
No. 2 straw fuel oil	8⅛-8⅜	9	7½-8
No. 6 residual	$1.65-1.75	$2.15-2.25	$1.75-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.15	7.4

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5-13.5
750 vis., No. 3-4 neutral	14.75-16
2,000 No. 5-6 neutral	16.5-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock 0-10 pp.	27-28
200 vis., No. 3 neutral, 0-10 pp.	16.5-18.5

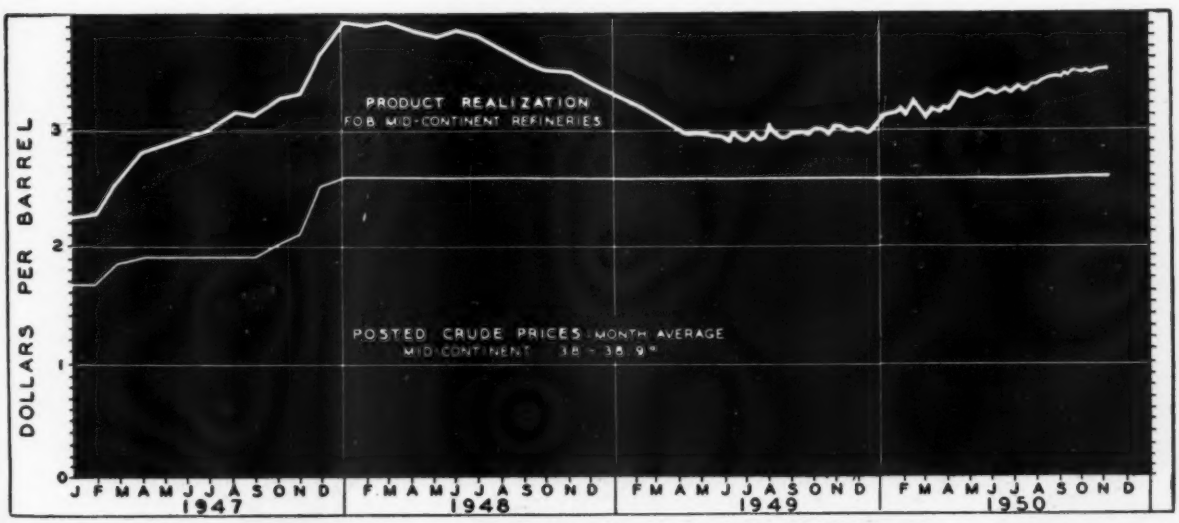
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	29.5
180 vis., 0 p.t. neutral	30.5

WAX

Mid-Continent

132-134 A.M.P.	5.9



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.52 for week ended November 18, $3.51 for previous week, and $3.02 for November 1949.

KELCO

Safety

BREAKOUT

AND SPINNING LINE CATHEADS

KelCo Safety Breakout Catheads are available in two sizes—Model 12 for light drilling rigs and servicing hoists—Model 16 for medium and heavy drilling rigs—choice of mechanical, hydraulic or air controls on either model. Tong line and patented tong block furnished at no extra charge.

AVAILABLE THROUGH YOUR FAVORITE SUPPLY STORE

Representatives in all principal oil fields

Be Safety Wise — KelCo-Ize

KELCO **BEN F. KELLEY CO., Inc.**
TULSA, OKLAHOMA

SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS • TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS

Effortless way to reduce Pumping Costs!

Specify DARCOVA

valve cups, seating cups and rings

The Original composition valve cup ...still the best!

• Precise control of all materials and processes from lab to well means exceptional resistance to wear and deterioration . . . fewer pulling jobs! • Different textures, scientifically developed, fully proved, give peak efficiency and longer flex-life at *any* depth! • Accurately controlled sizes for any make or size pump . . . no misfit inefficiency! • Ask for *genuine* Darcovas at your supply store.

DARLING VALVE AND MANUFACTURING CO.

Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP

Pritchard's

NEW Quintair*

AIR COOLED HEAT EXCHANGER

For Dependable, Efficient Cooling or Condensing of Liquids, Gases or Vapors

- Lower Installed Cost
- Higher Efficiency
- Fewer Parts to Assemble
- Lower Maintenance Costs
- Lower Operating Costs
- Many Industrial Uses

*Registered Trade Name

Write for *FREE* Bulletin No. 11.0.080

EQUIPMENT DIVISION
J.F. Pritchard & Co.
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District Offices:
CHICAGO • HOUSTON • NEW YORK • PITTSBURGH • TULSA • ST. LOUIS
Representatives in Principal Cities from Coast to Coast

EQUIPMENT MEN . . . in the News

H. K. Porter Forms Jarecki Valve Division

H. K. Porter Co., Inc., Pittsburgh, has announced the formation of Jarecki Valve Division, Tulsa, to handle the manufacture and sale of Jarecki valves formerly produced at the Jarecki Manufacturing Co. plant in Erie, Pa.

Established in 1852, the Jarecki company manufactured a complete line of iron and bronze valves and cocks. These will now be produced in H. K. Porter's Hinderliter Tool Co. Division plant at Tulsa.

Jarecki valves have wide application in oil and gas, power, and general industrial fields. Distribution of Jarecki valves is handled through the Jarecki oil-field supply stores, the more than 3,000 Jarecki jobbers, and direct through the main plant in Tulsa.

Weimer Is Named Rockwell Advertising Manager

W. F. WEIMER

W. F. Weimer has been named advertising manager of Rockwell Manufacturing Co. of Pittsburgh effective January 1, 1951. He succeeds William A. Marsteller, who has resigned as vice president of Rockwell to establish The Marsteller Co., marketing and advertising consultants, to be located in Chicago after the first of the year.

Weimer has been associated with the Rockwell organization for more than a decade in the gas-products sales department, as editor of employe publications, and, for the past several years, as advertising manager of the Pittsburgh Equitable Meter Division.

Erwin Appointed District Manager for Enterprise

P. E. (Pete) Erwin has been appointed district manager of the Los Angeles branch office of Enterprise Engine & Machinery Co., it has been announced by James E. Watson, general sales manager.

Erwin served with Bethlehem Supply Co. of California for 12 years, where he was manager of machinery sales. Prior to that he was with Union Oil Co. in Los Angeles area as superintendent of power maintenance.

In his new capacity as district manager with Enterprise, Erwin's primary activities will be in oil-field, pipe-line, and stationary engine sales.

Staples Named to New Sales Job by Carpenter

William R. Staples, formerly West Coast representative, has been appointed assistant to the manager of sales, Alloy Tube Division of The Carpenter Steel Co., Union, N. J. Paul E. Kelly has taken over West Coast duties formerly handled by Staples.

Gardner-Denver Establishes Canadian Plant

To provide increased service for its Canadian business, Gardner-Denver Co., manufacturer of rock drills, air compressors, pumps and equipment for mining, contracting, oil-field, and industrial purposes, is establishing a Canadian plant, officials of the company announced.

The new plant will be located at Brantford, Ont., and will be operated by Gardner - Denver Co. (Canada), Ltd. Key production men will be temporarily transferred from the parent plant, Quincy, Ill., to provide the necessary initial supervision, but both skilled and unskilled labor will be obtained in Canada.

Production of the new plant will be handled through the seven branch offices which Gardner - Denver Co. maintains in Canada.

Security Names Campbell As General Sales Manager

MAX CAMPBELL

Max Campbell has been named vice president and general sales manager of Security Engineering Co., Whittier, Calif. Otto Hammer, president of Security, made the announcement, stating that Campbell will assume his new duties as of December 1.

Campbell has been actively connected with the oil industry and with the sale of oil-field equipment since his graduation from Rice Institute in 1938. He received his field training in Texas with Hughes Tool Co., and has been a member of their sales organization until his appointment to the vice presidency of Security.

GMC Truck Men Receiving Refresher Courses

District managers of the GMC Truck & Coach Division are receiving a refresher course of training in parts and service, business management, financing, and advertising, according to John E. Johnson, general sales manager of the division.

One-week schools emphasizing these subjects were begun at the factory early in November further to increase the effectiveness of 115 GMC district managers who make everyday contact with GMC dealers.

(Continued on page 127)

Petreco's New California Headquarters

The Petroleum Rectifying Co. has consolidated its office, laboratory, service, and manufacturing facilities in the Signal Hill district of Long Beach, Calif. A new office building was constructed and recently occupied, and existing buildings modernized.

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

6,000′ OF USED 8⅝″ O.D. 22#, machine cleaned, beveled and welded in 40′ lengths ready to go, priced $1.35 per ft. located East Texas, apply A. A. Gilbert Pipe & Supply Co., Shreveport, La. Ld. 97, P.O. Box 986.

WILSON Mogul Draw Works Unit with compound powered by International UD-18 Motor complete with 55-foot double telescoping mast ready to use. Two Traveling Blocks and Hooks, Rotary, 4-foot Substructure. All in good condition. Real Bargain at only $6000.00. Contact D. C. Bonnet Trucking Co., New Iberia, La.

FOR SALE: Approx. 10,000 ft. 4½″ OD Heavy Tubing, ⅜″ to 9/16″ Wall, random lengths 12 to 18 Ft. Also, 5″ OD Heavy Tubing, ½″ Wall. Both good used condition. M. Kaplan & Son, P. O. Box 1883, Phone 5112, Monroe, La.

GENERATORS for diesel driven electric power, 156 KVA, 240/480 volt, 3 phase, 60 cycle, 900 RPM, complete with exciters and control cabinets, connections for parallel operation of two or more generators, brand new, manufactured by Electric Machinery Manufacturing Company, $2000.00 each, seven available, Northern Ordnance Incorporated, Minneapolis, Minnesota.

PIPE LINE EQUIPMENT for sale: Swing Crane, Trackson Model CT-9, practically new, fits International TD-9. $1000.00. Woodard Truck & Tractor Co., Brady, Texas.

6,218 FEET 7″ O.D. 17# new seamless casing H-40 Rg 2 @ 2.90 ft. Phone 5-8850, Tulsa.

Several Army Surplus 4½″ x 6″ Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN.: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

SEAMLESS BOILER TUBES

1 ¼″ OD—100,000 ft.
1½″ OD—100,000 ft.
2″ OD—75,000 ft.
3¼″ OD—35,000 ft.
3½″ OD—40,000 ft.
5⅝″ OD—25,000 ft.

All approximately 9 gauge wall.
Excellent Used Condition.
Single or Double random lengths.

WRITE—WIRE—PHONE

Sonken-Galamba Corp.
2nd and Riverview (X-659)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO
Box 107, Red Fork Station, Tulsa, Oklahoma

USED "CATERPILLAR" R5 TRACTOR WITH CARDWELL PG 150 PIPELAYER, 13 FT. BOOM—HAS COUNTERWEIGHTS
VERY REASONABLY PRICED—
HOBSON AND COMPANY
YOUR "CATERPILLAR" DISTRIBUTOR
2131 Washington Street
Kansas City, Missouri

1—4′0″ ID x 40′-6″ x 1¼″ thick tower; 1—7′-0″ ID x 57′ x ½″ thick tower, 19 CI bubble trays; 1—7′-6″ ID x ½″ thick tower, 25 CI bubble trays; 1—2′-6″ dia. x 40′-3 compartment tower, 15 bubble trays. Tri-State Supply Company, Box 610, Mt. Pleasant, Texas.

NATIONAL "50" Compound Double Drum Rig 126′ Cantilever L. C. Moore Mast. 10′ substructure. 6,000′ 4½″ drill pipe. This rig complete and in excellent condition. P. O. Box 205, Sta. B, Bakersfield, California.

FOR SALE: Model S Cardwell Drawworks Powered with WAK Waukesha 5 Speed Transmission 10 Speeds Forward, Good Condition. Longhorn Supply Company, Box 4149, Houston, Texas.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company. Box 1360, Seminole, Oklahoma.

NEW COUPLINGS

1600 2″ 10 R.T. non-upset tubing
50 5½″ 10 V thread casing
96 7″ 10 V thread casing
2 7″ 8 R.T. casing
79 6⅝″ 10 V thread casing

Used Couplings

762 2″ 10 R.T. non-upset tubing

Rock Island Oil & Refining Co., Inc.
321 West Douglas, Wichita, Kansas
Telephone 5-5674

EQUIPMENT FOR SALE

DRILLING rig located at Greggton, Texas, yard, and consisting of complete steam rotary drilling rig without drill pipe, including 2 120 H.P. oil well boilers, 1 6″ Union Tool unitized draw works, 1 12x12 Ajax roller bearing steam engine, 1 14½x7½x18 Ideal mud pump, Ideal rotary table, swivel, crown block, traveling block, etc. Contact Rudco Oil & Gas Company, Box 2018, Tyler, Texas.

BOILERS FOR SALE: 18 Code Oil Field Boilers, 50 to 87 H.P., 100 to 200 Lbs. W.P., Operated Under Hartford into 1948, Not Fired Since. Located on Leases Vicinity Pampa, Texas. Offered Subject to Prior Sale. $500.00 to $700 each, as is, where is. Contact Max Harbison, Kewanee Oil Company, Pampa, Texas.

FOR SALE: One 350 KW, 480 volts, 3 phase, 60 cycle; and one 480 KW, ditto, Superior natural gas engine generating units, complete with generating panels. Max E. Landry, Inc., 436 Mayo Building, Tulsa, Oklahoma. Phone 5-5639.

CASING—5½ and 7″ No. 1 grade, lap-weld and seamless.
TUBING—2″, 2½″, and 3″ regular and upset.
WATER WELL CASING—5⅝″ and 6¼″ Attractively priced.

D. A. MORITZ CO.
9th & B&O, Braddock, Pa.

FOR SALE
600
Fisher Gas Regulators

L. R. KERSHAW
Muskogee, Oklahoma

PIPE FOR SALE

Approx. 25,000′ of 8″ OD, DRL, used LW line pipe.

Approx. 10,000′ of 4½″ OD, R-2, used seamless pipe, new 8 rd. thrds. and new regular casing couplings.

Approx. 5,500′ of 5 9/16″ OD, R-2, used seamless pipe, new 8 rd. thrds. and new regular 5½″ casing couplings.

Approx. 6,500′ of 7″ OD, 28#, R-2, used seamless casing, new 8 rd. thrds. and new regular casing couplings.

Approx. 1,600′ of 24″ OD, non tested seamless pipe.

BROWN PIPE & MACHINERY CO.
P.O. Box 2368, Phone 3-9391, Corpus Christi, Texas

EQUIPMENT FOR SALE

3—160 CUBIC FOOT Air Compressors. Diesel: Gasoline. J. C. Morrison, Midwestern Drillers, Liberal, Kansas. Phone 2441.

FOR SALE: 900′ 3″ line cemented. Number one—75c, and storage tank 8′ x 26′ horizontal, capacity 12,500 gallons, 3/16 plate. Welded, Sets on cradle. Good as new—$500.00. M. J. Regan, Coffeyville, Kans.

COMPLETE Slimhole Rotary Rig, mounted on Dodge truck, strong Derrick. Ballbearing throughout, strong, sturdy. 5X10½ mounted mudhog pump, Mission equipped. 10 barrel steel water tank. 700 ft. 12 lb. drill pipe 1500 feet water or oil rig. Money maker, two men operate. $5,500 cash. Box 106, Seminole, Oklahoma.

FOR SALE

4—Large 6 x 6 Trucks, 240 H.P. Engine—excellent condition.

321 West Douglas
Wichita 2, Kansas

FOR SALE

9—230 H.P. Bessemer, Type 10 Engines with compressors, Steel Buildings, Valves, and Fittings complete for installation. Located Salem, Illinois Oilfield.

ENGLE PETROLEUM, INCORPORATED
Box 655, Evansville, Indiana
Telephone 5-5179

STANDARD BLACK PIPE

In Good Used Condition

2″—45,000 ft.
3″—25,000 ft.
4″—35,000 ft.
6″—10,000 ft.
9″—10,000 ft.

Single Random Lengths.
Immediate Delivery.

Recently removed from refinery.

WRITE—WIRE—PHONE

Sonken-Galamba Corp.
2nd and Riverview (X-658)
Kansas City 18, Kansas

EQUIPMENT FOR SALE

FOR SALE: Sullivan Drilling Rig Model 200 RT on truck complete with 2500 feet practically new drill pipe, good condition. $27,500. James F. Gray, 15th Floor Praetorian Bldg., Dallas 1, Texas.

FAILING 3000′ capacity drill, truck mounted. Mast will rack 40′ pipe, 5 x 10 Gardner-Denver pump. Box D-780, The Oil and Gas Journal, Tulsa, Oklahoma.

#45 Star Spudder, Caterpillar Motor, new Kohler Light Plant, Chevrolet Truck, Trailer, complete tools. Rig and equipment in Kansas. Write J. N. Fetzer, 644 Diversey Parkway, Chicago 14, Ill.

FOR SALE: Westcott, Foxboro and Emco Gas Meters, Geo. R. Milner. Box 124, Okmulgee, Oklahoma.

FOR SALE: 2 Fairbanks-Morse gas engines No. 208-108, excellent running condition. Mid-Illinois Petroleum Co., 1104 Fayette Ave., Springfield, Ill.

LARGE QUANTITIES

6″ #490 Crane Gate Valves
4″ & 6″ Victualic Couplings
All NEW ready for shipment.
Attractively priced for quick sale.

NEWMAN'S, INC.
Box 1865, Tulsa, Okla.
Phone 4-8188, LD 635

AVAILABLE

Twin Beechcraft, equipped for Executive use. Pratt and Whitney motors. Variable pitched propellers. Automatic Pilot. Two-way radio. Always hangared. Perfect condition. Will take producing royalty or proven lease.

William H. Parker

408 Woodlawn Road, Baltimore 10, Md.

EQUIPMENT FOR SALE

AMPHIBIOUS airplane: Eight place twin-engine Grumman Goose for sale or lease. Formerly owned by large oil company, excellent condition. Richard French. Genesee Airport, R.D. 2, Rochester, New York.

EQUIPMENT WANTED

RECORDING GAUGES WANTED
State pressure and if daily or longer. R. L. Pattinson, Aylmer, Ontario, Canada.

WANTED

16″, 18″ and 20″ collars with or without threads or pipe suitable to produce them.

SOONER PIPE & SUPPLY CORP.
Box 574, Tulsa, Okla.

HELP WANTED

DRILLER ON new Bucyrus and Star spudder. Work near Great Lakes Area. Big hole experience necessary. Box D-777, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

ASSISTANT GEOLOGIST for work in Venezuela on single status, degree in geology plus two years experience with core drill or related work, salary commensurate with experience and ability. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

EXPERIENCED GEOLOGIST—Senior Geologist qualifications. Imagination, good subsurface background; particularly South Texas and Gulf Coast, who desires position with active, aggressive independent company. Location: San Antonio. Replies confidential. Box D-779, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOLOGIST for work in Venezuela. Ten years' experience with four years' interpretive work, family status, salary commensurate with experience and ability. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

PETROLEUM ENGINEER (JUNIOR) with at least 1 year production or drilling experience to work in Venezuela. Single status preferred. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

HAVE opening for superintendent small gasoline plant. State experience in letter. Box D-772, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE Line Experienced? If trained for definite work and under 40 write Employment Dept., P. O. Box 2239, Kansas City, Missouri.

ENGINEER WANTED

Major company located in central Ohio desires graduate mechanical Engineer with several years experience in Spudder design. Give age, educational background and complete details of experience. Our employes know of this ad. Reply to Box D-773, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL EXPLORATION

Party Chiefs **Surveyors**

Permanent field jobs on seismograph crews. Must be experienced in all phases of this work. Permanent jobs at good salary.

THE GEOTECHNICAL CORP.
3712 Haggar Dr. **Dallas 9, Texas**

OFFICE MANAGER—CHIEF ACCOUNTANT

Excellent opportunity for man experienced and qualified in oil accounting with well-established, integrated Oil Company. Send photo with data sheet.

Box D-767, The Oil and Gas Journal
Tulsa, Oklahoma

LINE PIPE FOR SALE

100,000′ 2⅜″ OD 3.75# & 4# Good Used Lapweld T&C Range 1 Line Pipe
55,000′ 4″ OD x .130″ Wall Seamless, 5.4#, Used as sweet gas line, taken up in 30′ Lengths. Above ground and available for immediate inspection and delivery, FOB Mobeetie, Texas.
25,000′ 6⅝″ OD 18.97# Excellent Grade Used Lapweld, Machine Cleaned, Beveled Ends, 20′ RML.
5,000′ 6⅝″ OD 18.97# Strictly No. 1 Seamless, 45′ Lengths, Plain Ends.
5,000′ 6⅝″ OD x .188″ Wall 12.89# New Spiral Weld, 50′ Lengths, Beveled Ends.
11,000′ 10¾″ OD 34# Good Used Lapweld, P.E., 20′ Lengths.
10,000′ 18″ OD x .312″ Wall 59.03# New and Used Electric Weld, 40′ Lengths.
8,000′ 20″ OD x .312″ Wall 65.70# New and Used Electric Weld, 40′ Lengths.

CASING & TUBING

40,000′ 2⅜″ OD 4# Good Used Lapweld Range 1 Tubing with New 10 Round Threads and Collars.
7,000′ 7″ OD 20# Good Used Lapweld Range 1 T&C Casing 10 V-Thd.
5,000′ 8⅝″ OD 25# Good Reconditioned Casing, 8 V-Thd., T&C, Range 1
5,000′ 10¾″ OD 35.75# Good Used Lapweld T&C Casing, Range 1, 8 Thread

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

A. J. STRUBEL

SIDney 1791 . . . 4946 Murdoch, St. Louis, Mo.

HELP WANTED

POSITION Available February 1, 1951, Assistant or Associate Professor with Masters degree or higher in Petroleum Engineering to teach reservoir engineering courses in rapidly growing school with excellent laboratory and other facilities. Qualifications will determine salary, but will be comparable to industry. Location Southwest. Box D-765, The Oil and Gas Journal, Tulsa, Oklahoma.

CRUDE Oil Treating Engineer, minimum 2 years' experience, college graduate preferred. Headquarters Oklahoma City, territory covers 10 states. Salary commensurate with experience. State education, background, experience, etc. Reply Sohio Petroleum Co., Industrial Relations, Skirvin Tower, Oklahoma City, Oklahoma.

WANTED: Chemical Engineers for process development and process design on petroleum refining and chemical processes. Prefer individuals with several years' experience in one or both of above fields. Southwest location. Write F. J. Heller, Research and Development Department, Phillips Petroleum Co., Bartlesville, Oklahoma.

ELECTRICAL ENGINEER: New large oil pipeline company requires electrical engineer to handle design, construction and devise maintenance procedures, all classes equipment to 5-KV switch gear. Some familiarity with sub-stations to 110-KV, 5000-KVA desirable but not required. No communications or electronics involved. Include full professional and personal details and minimum salary, first letter. Job is permanent. Box D-761, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

CHEMICAL ENGINEERS

An American Oil Company operating in Latin America requires for its regular staff experienced Chemical Engineers. Must have degree in Chemical Engineering and several years experience in oil refinery process design. Will be required to make engineering studies and prepare process specifications for modifications or additions to oil refinery process equipment to increase capacity, improve product yield, or quality, or reduce manufacturing costs.

Write giving age, education, marital status, and experience resume. Your communications will be held in strict confidence.

Box 308-C

Radio City Station

New York 19, New York

STRUCTURAL DESIGNER WANTED

C.E. graduate major in structural design with 3 to 5 years experience in design of steel and reinforced concrete structures and in general drafting room procedure. Experience in structural design in oil refinery or chemical industry desired. Location Chicago.

BOX D-774

THE OIL AND GAS JOURNAL

TULSA, OKLAHOMA

HELP WANTED

Graduate Engineers

GOOD OPPORTUNITIES

for

CHEMICAL ENGINEERS: Five to ten years' experience in Chemical Operations or Development. Work in Application of unit operations, evaluations and economic studies leading to cost reduction. Must be graduate, free to travel.

ENGINEERS FOR UNIT OPERATIONS: Five years' experience in the fields of Agitation, Drying or Grinding, Blending and Screening. Specialized knowledge of Heat Transfer, Fluid Flow and Mass transfer are desirable. Must be graduate. Consultation work.

INSTRUMENTATION ENGINEERS: Five or more years of progressively difficult experience in Instrument Research Development or Design. Must have broad and thorough knowledge of instrument theory and application. Should have some knowledge of Chemical Equipment and its operation. Must be graduate.

POWER ENGINEERS: Must have five to fifteen years' experience in some of the following: operating, testing and maintaining power plant equipment, supervising power plant operations, making cost and evaluation studies, heat balance work, power cost accounting, design and layout of power plants, and the selection and installation of power equipment. Must be graduate.

AIR CONDITIONING ENGINEERS: At least 7 years' experience in selection and operation of heating, air-conditioning, ventilating and refrigeration equipment. Well versed in the theory of thermodynamics, fluid flow and heat transfer. For consulting evaluation, and economic operation services. Must be graduate.

MAINTENANCE ENGINEERS: Five to ten years in planning maintenance work, establishing manpower and material requirements, scheduling and controlling work. Must be thoroughly familiar with Machine and Hand Tools used in Plant Maintenance Work. Must have supervised persons doing maintenance work. Must be graduate. For consultation work.

Give experience, education, age, references, personal history, salary received and salary expected. Please be complete and specific.

ALL INQUIRIES WILL BE CONSIDERED PROMPTLY AND KEPT CONFIDENTIAL

E. I. du Pont de Nemours & Co., (Inc.)

ENGINEERING DEPARTMENT PERSONNEL

Wilmington 98, Delaware

HELP WANTED

FOR IMMEDIATE employment. Trained experienced Observers, Surveyors and computers. For seismic exploration crews. Age limit 42 years. Domestic and foreign work. Submit experience record in first letter. All replies confidential. Box D-730, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION MAN WANTED

If you want to make a change, we can pay good salary. Man can also buy leases and royalties. Production is approx. 6000 ft. North Texas. Age 40-50. All applications and information held confidential. Write Box 1824, Oklahoma City, Okla.

A LARGE Refinery in the middle West wants Chemists, Chemical Engineers and Mechanical Engineers. State full qualifications in first letter. Write Box D-762, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION JUNIOR ENGINEER Needed immediately. Write Employment Dept., Box 2239, Kansas City, Missouri.

MANAGER-OPERATOR for natural gas system. Excellent opportunity for young engineer with gas experience. State age, experience, salary expected and when available. Write P.O. Box 155, Quitman, Miss.

CHEMIST OR CHEMICAL ENGINEER

For interesting Light Products Research & Development Section Rocky Mountain Refinery. Young college graduate preferred. Send photo with data sheet.

Box D-764, The Oil and Gas Journal, Tulsa, Oklahoma

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

MECHANICAL ENGINEER

New large oil pipeline company requires mechanical engineer to handle design, supervise construction, and devise maintenance procedures on all pump station equipment to 5000 HP, not including electric equipment. Station specifically includes 2000 HP maximum IC engine and centrifugal pump. Complete familiarity with high pressure oil piping required. Men under 35 preferred. Include full professional details and minimum salary first letter. Box D-781, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PURCHASING AGENT
15 Yrs. Exp. Includes Processing, Engineering. Available.
Box D-783, The Oil and Gas Journal, Tulsa, Oklahoma

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

QUALIFIED Purchasing Agent, warehouse operations, also accounting and public relations experience. Desire change, married, age 42. Box D-759, The Oil and Gas Journal, Tulsa, Oklahoma.

PUMPER understands production treating oil and upkeep of equipment, available. Box D, Carney, Okla.

SITUATIONS WANTED

LUBRICATING OIL Chemist, Compounder, Technical Adviser. 15 years experience. May I submit my qualifications in detail? Southwest or West. Box 771, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOLOGIST with three years experience in the field (party chief) and three years reviewing field work in Head Office, desires position in Canada. Still under contract, ready to start new employment next January. Write Box D-769, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING INDUSTRY Specialist desires position as branch manager, representative, or heavy administrative responsibility. Thoroughly trained and experienced. Age 36. Box D-776, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED LANDMAN, age 30, Texas A. & M., seven years with major oil company, desires position with stable oil organization. Location unimportant. Capable all phases of Land Department. Minimum salary $400.00. Reply Box D-775, The Oil and Gas Journal, Tulsa, Oklahoma.

PLANT MANAGER of LUBRICATING GREASE AND OIL PLANT desires connection with progressive oil company. Technical background, extensive experience in plant control and management. Box D-768, The Oil and Gas Journal, Tulsa, Oklahoma.

ASPHALT SPECIALIST — Research, development, manufacturing. Over twenty years specialized experience in paving, roofing asphalts, road oils, specialties, additives. Seeks responsible position where creative and executive ability, as well as knowledge and experience, can be utilized in development or manufacturing. Box D-782, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

LEASE AND DRILLING BLOCKS

FOR SALE in Northwest New Mexico, new oil district, 26,000 acres deeded, 112,000 acres deeded; no outstanding oil leases on either, all minerals intact in each block of land, lots of water and big game. Price $10.75 per acre. Will sell all together or will divide the land. Contact: C. O. Walling, Burkburnett, Texas. Phone 306, Box 695.

80 ACRES, and $5,000 dry hole money available, for a well to the Prue sand. Highly defined Geological Structure. Lincoln County, 17-15-5. 1115 So. Canton, Tulsa, Oklahoma. 9-5207.

U. S. LANDS in Colorado can be filed for Government oil lease in developing area. Good opportunity. Small Expense. Write S. W. Pressey, Pueblo, Colorado.

10,000 ACRE block in Roundup (Central Montana) area. Promising structure, some development done, limited production. $2.50 per acre and 2½% override. For particulars write P. O. Box 937, Great Falls, Montana.

HAVE 45 STAR rig complete with tools ready to run, also 7" and 8" and 10" casing; will put use of rig and tools in on drilling deal for working interest in well. Must be good location. Or will sell. Rig located near Rose Hill, Virginia, near Cumberland Gap, Tenn. B. N. Cardwell, 204 North 19th St., Middlesboro, Kentucky.

FOR SALE: One hundred fifty acre oil lease, eight old wells all pumping, twenty good locations to drill, two and one-half miles north Scottsville, Kentucky. Buel Wilson, Scottsville, Kentucky.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington New Mexico.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225 Great Falls, Montana.

FOR SALE OR CHARTER

FOR SALE OR CHARTER: 83' TWIN SCREW DIESEL BOAT, IDEAL FOR SURVEY OR CREW. B. O. SCOTT, 5033 FOURTH STREET, PORT ARTHUR, TEXAS.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

FOR SALE

TITANIA GEMSTONES

Can supply the new sensationally beautiful synthetic titania gemstone "rainbow diamond," facet cut, showing greater brilliance than the diamond and at a small fraction the cost. Harder than amethyst. Christmas is coming.

C. C. BOAK—Tonopah, Nev.

EQUIPMENT MEN

(Continued from page 123)

Union Wire Rope Opens Branch at Jacksonville

The thirteenth in its network of branch offices and warehouses has been opened at Vega Street in Jacksonville, Fla., by Union Wire Rope Corp.

George Golay, who has represented the firm in Southeastern territory, is now district manager. Melvin Hass, graduate of Kansas University and Union's laboratory and mill training school, has joined the Jacksonville sales staff and is assigned to the Carolinas, Georgia, and Alabama territories.

Other transfers of Union Wire Rope sales personnel takes D. E. Bedford to eastern Pennsylvania and New York territory from Iowa and Nebraska where he has served several years. Eugene R. Rhue, graduate of Kansas University and Union's laboratory and mill training school, will succeed Bedford in the Iowa-Nebraska territory.

General Refractories Names Fay to Sales Work

General Refractories Co., Philadelphia, has announced the appointment of Mervin A. Fay as assistant general sales manager. Fay has been assigned to the research department of the company since 1946, as ceramic engineer, having previously been associated with Bethlehem Steel Co. in a similar capacity.

Kansas Fields

(Continued from page 116)

oil per day from Lansing at 3,437-61 ft., 3,472-79 ft., and 3,495-99 ft., TD 3,500 ft., anhydrite 1,783 ft., Heebner 3,356 ft.

Sedgwick County: McBride 1 Pipkin, NW SW NW 6-28s-4w, elev. 1,414 ft., pumped 50 bbl. oil per day from 3,785-93 ft., TD: lime 2,864 ft., Lansing-Kansas City 2,916 ft., Mississippian 3,734 ft., Mississippi dolomite 3,773 ft.

KANSAS WILDCAT FAILURES

Barber County: Coppinger 1 Rinke, SE SW SW 36-32s-14w, elev. 1,966 ft., dry, TD 5,313 ft., Toronto 4,075 ft., Douglas 4,103 ft., Lansing-Kansas City 4,243 ft., Mississippi lime 4,744 ft., Kinderhook 4,866 ft., Viola Maquoketa 5,048 ft., Simpson 5,188 ft., Arbuckle 5,296 ft.

Barton County: Aladdin 1 Stout, SW SW NE 23-18s-11w, elev. 1,767 ft., dry, TD 3,361 ft.

Ellis County: Brooks Pierce 1 Veach, SE SE NE 4-11s-20w, elev. 2,025 ft., dry, TD 3,735 ft., Heebner 3,304 ft., Lansing-Kansas City 3,345 ft.

Graham County: North American Car 1 Woodside "A," NW NW NE 34-7s-25w, elev. 2,471 ft., dry, TD 4,505 ft., anhydrite 2,130 ft., Heebner 3,679 ft., Lansing-Kansas City 3,702 ft.

Greenwood County: Jackman-Jackman 1 Hawthorne, SW NW NW 13-23s-11e, dry, TD 1,991 ft., Bartlesville 1,908 ft.

Pawnee County: ElDorado 1 Behrens, SW SW SE 16-20s-17w, elev. 2,077 ft., dry, TD 3,995 ft., anhydrite 1,162 ft., Heebner 3,476 ft., Lansing-Kansas City 3,550 ft., Marmaton 3,805 ft., Sooy 3,905 ft., Arbuckle 3,931 ft.

Russell County: Ash 1 Anschutz "A," NW NW NW 8-14s-14w, geological test in Hall-Guerney area, elev. 1,889 ft., dry, TD 3,376 ft.

Stafford County: Petroleum, Inc. 1 Tieperman, SW SE NW 31-22s-12w, elev. 1,859 ft., dry, TD 3,789 ft., Heebner 3,204 ft., Lansing-Kansas City 3,363 ft., Sooy 3,621 ft., Viola 3,657 ft., Simpson 3,713 ft., Arbuckle 3,774 ft.

Sumner County: Wakefield-Kanotex 1 Geeslin, SW SW NW 26-34s-1w, elev. 1,128 ft., dry, TD 4,322 ft., Stalnaker 2,816 ft., Lansing 3,209 ft., Kansas City 3,381 ft., Mississippi lime 3,922 ft., Kinderhook 4,242 ft., Simson shale 4,297 ft., Simpson sand 4,301 ft.

Trego County: Sargent et al 1 Hillman, NW NW SW 30-12s-21w, elev. 2,348 ft., dry, TD 4,098 ft., anhydrite 1,716 ft., Heebner 3,622 ft., Lansing-Kansas City 3,659 ft., Sooy 4,034 ft., Arbuckle 4,083 ft.

LEGAL

3,978.36 acres of Tribal and 729.17 acres of allotted Indian Lands located in Twp. 12 N Range 22 & 23 E.; Twp. 13 N Ranges 21, 22, & 23 E.; Twp. 14 N Range E. and Twp. 16 N Range 31 E., BHM, in the Cheyenne River Reservation, South Dakota, are being advertised for oil and gas leasing, bids on which will be opened December 5, 1950, at 2:00 P.M., C.S.T. at the office of the Superintendent of the Cheyenne River Indian Agency, Cheyenne Agency, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Cheyenne River Indian Agency, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper, Wyoming.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 100 acres comprising the U. S. Naval Hospital Site at Long Beach, California, will be offered for oil and gas leasing, through competitive bidding at 1 p .m., Eastern Standard Time, December 6, 1950, when bids will be opened. Operations on the land must be so conducted as not to interfere with or endanger the use of the land as a hospital site. Details of the lease offering, how and where to file bids, and copy of the form of lease may be obtained by addressing an inquiry to the Oil and Gas Supervisor, at Los Angeles, California, or to this office. Marion Clawson, Director.

XUM

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Oklahoma Fields

(Continued from page 115)

S. D. Johnson et al 2 Bee, NE SE SE 33-4s-1w, elev. 985 ft., dry, TD 4,794 ft., Zuckerman 3,120 ft., Daube 3,575 ft., upper Anadarche 4,035 ft., lower Anardarcre 4,320 ft.

Choctaw County: National Associated Petroleum 1 Hall & Johnson, NW NW NW 35-7s-19e, dry, TD 1,673 ft. in shale, sand 530 ft.

Cotton County: Doswell and Pettigrew 1 Jones, SE SW NE 9-2s-13w, dry, TD 2,290 ft., sand 730 ft., granite wash 815 ft.

Creek County: Jackson, Runsey et al 1 Ware, NE SE NE 29-17n-9e, elev. 925 ft., dry, TD 2,750 ft.

Garvin County: Magnolia Petroleum 1 J. M. Cooper, NW SE SE 9-3n-2w, geological wildcat below 6,546 ft. in Antioch pool, OWDD, dry, TD 7,700 ft., McLish 6,644 ft., basal McLish 6,858 ft., Oil Creek 7,289 ft., Joins 7,423 ft., Arbuckle 7,480 ft.

Ellison & Pray 1 Miller, C NW SW 11-4n-4w, elev. 982 ft., dry, TD 8,111 ft., fifth Deese 7,895 ft., Springer 7,998 ft.

Kingfisher County: National Associated Petroleum 1 Stephens, C NE NE 15-16n-6w, elev. 1,098 ft., dry, TD 7,908 ft., Oswego 6,578 ft., Prue 6,736 ft., Verdigris 6,767 ft., Mississippian 7,050 ft., Woodford 7,544 ft., Hunton 7,595 ft., Sylvan 7,890 ft.

Logan County: Peppers Refining 1 Brooks, NE SE NW 28-16n-1e, elev. 1,026 ft., dry, TD 5,561 ft.

Love County: Ryan Oil 1 Barrett, C SW NW 33-6s-3w, elev. 775 ft., dry, TD 7,882 ft., Hoxbar 2,097 ft., Daube 3,220 ft., upper Anadarche 3,678 ft., lower Anadarche 4,160 ft., Chubbee 5,302 ft., Confederate 5,757 ft., Deese 6,830 ft., detrital 7-186 ft., Simpson 7,320 ft., Joins 7,856 ft.

Noble County: Aurora Gasoline and Howell & Howell 1 Seegars, NW NW SW 14-24n-2w, elev. 1,062 ft., dry, TD 4,785 ft., Oread 2,555 ft., Lovell 2,920 ft., upper Layton 3,560 ft., Big lime 4,048 ft., Oswego 4,106 ft., Mississippi lime 4,43 ft., Woodford 4,684 ft., Misener 4,704 ft., Simpson 4,715 ft., second Wilcox 4,765 ft.

Pawnee County: Harper-Turner and Youngblood 1 Stokes, SW SW NW 32-21n-4e, elev. 1,000 ft., dry, TD 4,254 ft., Dewey 2,420 ft., Hogshooter 2,750 ft., Layton 2,820 ft., Checkerboard 3,080 ft., conglomerate 3,207 ft., sand 3,262 ft., Oswego 3,345 ft., Prue 3,508 ft., lime 3,685 ft., Red Fork 3,730 ft., Mississippi lime 3,923 ft., Woodford 4,130 ft., Viola 4,162 ft., second Wilcox 4,223 ft.

W. O. Allen 1 Peck, NE NE NW 34-21n-7e, elev. 899 ft., dry, TD 2,652 ft.

CALENDAR OF EVENTS

The Calendar of Events will be found on page 26 of this issue, immediately following the feature "They Say."

Payne County: Waggoner & Co. 1 Cook, SW NW SW 33-18n-4e, elev. 894 ft., dry, TD 4,271 ft.

Stephens County: M. W. Bowers 1 Foster, SW NW NE 27-1n-9w, elev. 1,121 ft., dry, TD 2,415 ft.

North Central Texas

(Continued from page 113)

Brockheuser, Clark & Plumb Sur., 5 mi. SE Archer City, dry, TD 3,838 ft.

Ohio Oil Co. 1 C. L. Abercrombie, Blk. 158, J. W. Harris Subd., Club Ranch, 1½ mi. SW Archer City, dry, TD 5,170 ft., elev. 1,000 ft., Caddo 4,810 ft., conglomerate 5,125 ft.

Timberlake & Fair and Scott Brothers 1 S. M. Taylor, Jose Ostane Sur., A-333, 1½ mi. NW Archer City, dry, TD 3,910 ft.

Brown County: Con Oil Corp. 1 Renfro, Sec. 75, HT&B Sur., 3 mi. NW Owen, dry, TD 1,350 ft.

R. R. Grove 1 D. Hardy, 24-3-BBB&C, 3 mi. S Rising Star, dry, TD 1,335 ft.

Callahan County: J. M. Hickey & Sons 1 W. Foreman, Sec. 29, BAL Sur., 2 mi. N Elmdale, dry, TD 2,433 ft. in shale.

Plymouth Oil Co. et al 1 C. M. Caldwell, 22-5-SPRR, 7 mi. W Cottonwood, dry, TD 4,590 ft., elev. 2,159 ft., Caddo 3,680 ft., Ellenburger 4,482 ft.

Clay County: J. W. Hastings 1 Fultz, Blk. 56, Byers Bros. Subd., 2 mi. NW Petrolia, dry, TD 1,964 ft., Fusliana lime 1,266-70 ft.

J. W. Hastings 1 Lyons, Blk. 66, Byers Bros. Subd., 1 mi. NE Petrolia, dry, TD 1,961 ft.

Cooke County: C. W. Smith 1 Helen Lutkenhaus, John Barnett Sur., 2½ mi. SE Muenster, dry, TD 1,600 ft.

Fisher County: Snuggs & Neal, Inc. 1 E. H. Robertson, T. H. Cosby Sur. 315, ½ mi. NE Roby, dry, TD 5,307 ft., elev. 1,922 ft., Saddle Creek 3,632 ft., Canyon 4,930 ft.

Haskell County: T. G. Shaw 1 Ira Coleman, A. S. Randolph Sur. 69, 5½ mi. N Stamford, dry, TD 5,570 ft., elev. 1,519 ft., Caddo 5,767 ft., Mississippian 5,397 ft., Ellenburger 5,468 ft.

Jones County: J. W. Baldwin 1 W. D. Linville, 51-15-T&P, 3 mi. SW Nugent, dry, TD 2,170 ft., Dothan 1,399 ft., Bluff Creek 1,746 ft.

J. E. Connally 1 C. A. Johnson, 19-3-H&TC, 7 mi. NE Avoca, dry, TD 3,275 ft., elev. 1,526 ft., Lower Hope 1,830 ft., Adams Branch 2,670 ft.

Great Lakes Carbon 1 R. L. Connell, 4-2-T&NO, 7 mi. SE Anson, dry, TD 2,975 ft., elev. 1,725 ft., Flippen 2,094 ft., Reef lime 2,963 ft.

Grisham Hunter Corp. 1 M. K. Kennedy, McMullen & McGloin Sur. 337, ¾ mi. NW Radium, dry, TD 4,056 ft., elev. 1,695 ft.

Parker County: Kingwood Oil Co. 1 M. J. Gibson, R. W. Johnson Sur., A-756, 1 mi. NE Veal Station, dry, TD 3,689 ft., elev. 994 ft., Caddo 3,155 ft.

Shackelford County: Deep Rock Oil Corp. 1 Dawson & Conway, 183-1-TERR, 21 mi. NW Albany, dry, TD 5,360 ft., Bend 4,805 ft., Ellenburger 5,205 ft.

Stephens County: Arkansas Fuel Oil Co. 1W. S. Harrison, Sec. 1285, TE&L Sur., 8 mi. NW Breckenridge, dry, TD 4,650 ft., elev. 1,209 ft., Caddo 3,371 ft., Mississippian 4,407 ft., Ellenburger 4,485 ft.

Connally Thornton 4 H. W. Hart, Sec. 2065, TE&L Sur., 7 mi. SE Breckenridge, dry, TD 1,991 ft. in sand and shale.

Throckmorton County: Russell Maguire 1 C. W. Buchanan, Sec. 927, TE&L Sur., A-343, 9 mi. NW Woodson, dry, TD 4,772 ft., Mississippian 4,745 ft.

L. A. Warren Drilling Co. 1 W. E. Parks Estate, Sec. 700, TE&L Sur., 2 mi. W Woodson, dry, TD 505 ft., gas sand 459-461 ft.

Young County: Star Oil Co. 2 DeWitt McClatchey, TE&L Sur., 2 mi. SW Olney, dry, TD 1,150 ft.

Star Oil 3 DeWitt McClatchey, TE&L Sur., 2 mi. SW Olney, dry, TD 1,147 ft., Gunsight lime 1,095-96 ft.

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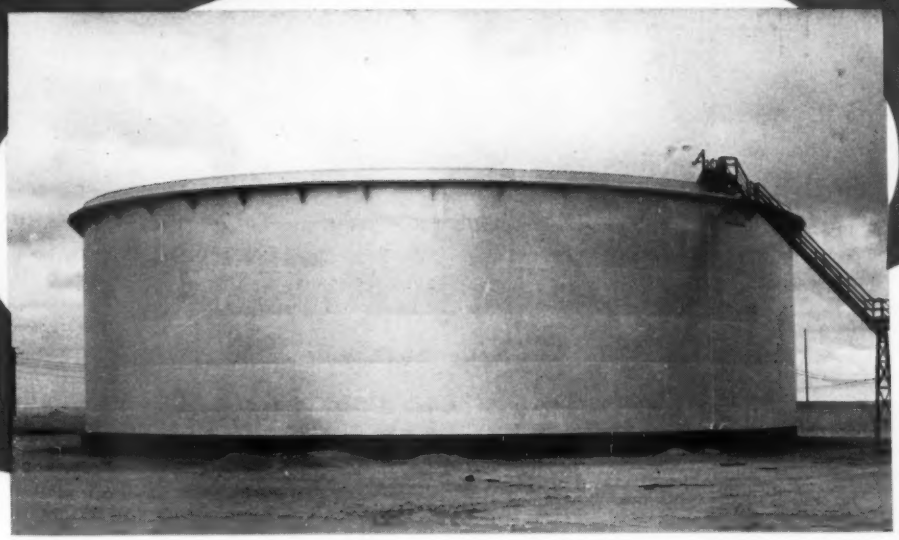
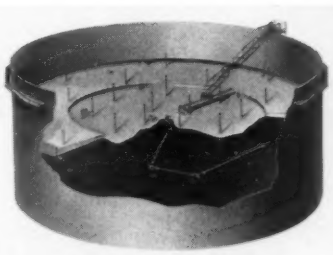
Why does THIS tank store gasoline . . .

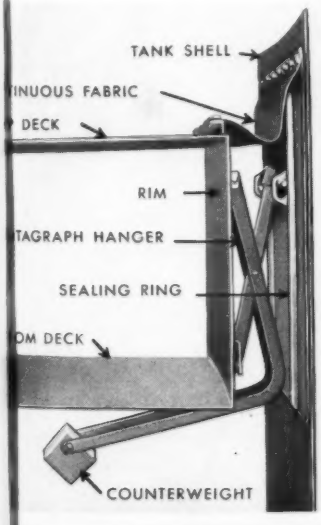


with greater safety . . . less evaporation loss?

Above: 150,000-bbl. tank equipped with a Horton PONTOON Roof at refinery in Venezuela. It is used to store motor gasoline.



Right: Cutaway view showing how the PONTOON Roof floats directly on the liquid—a feature that decreases evaporation losses, reduces the fire hazard and cuts down corrosion of roof and tank plates.



Left: This is the Horton seal that is used to close the space between the deck of a Horton PONTOON Floating Roof and the tank shell. It is one of the best devices ever invented for preventing the escape of vapor around the edge of a floating roof. The high efficiency of this seal not only cuts down evaporation losses—it also reduces the fire hazard because it makes certain that an inflammable mixture of vapor and air will not persist above the roof.

THE REASON is because the tank is equipped with a Horton PONTOON ROOF—an outstanding type of floating roof which reduces the fire hazard and cuts down all types of evaporation losses from flat-bottom tanks storing gasoline, crude oil and similar volatile liquids.

There is no vapor space in a tank equipped with the PONTOON Roof because it floats directly on the liquid. The roof eliminates the air necessary to support combustion and thus reduces the fire hazard.

Evaporation losses due to *breathing* are prevented because there is no air-vapor mixture under the roof to expand as the temperature rises. *Filling* losses are eliminated since there are no vapors under the roof to be displaced by incoming liquid. *Boiling* losses are reduced as the pontoon section of the roof provides air space insulation for over half the area. If, however, some boiling of product should occur, the vapors are trapped beneath the flexible center section of the roof due to the bottom of the pontoon being sloped toward the center. The collected vapors lift the center portion of the deck and furnish insulation which reduces further boiling.

The Horton PONTOON Roof can be installed on new or existing tanks which are 60 ft. in diam. or larger. It is recommended especially for tanks filled and emptied frequently, tanks in blending service and tanks storing corrosive products. Write our nearest office for full details about this efficient type of Horton Floating Roof.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

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Lindsay-Scott & Engineering Company, Limited, Motherwell, Scotland

XUM

Hughes Flash-Weld your best buy in tool joints!

Probably no coupling in industrial use takes the terrific beating that the joints of a drill stem undergo. During rotation, they are constantly twisted, flexed and pulled by the heavy weight of the stem and collars, and ground by gritty mud and abrasive sands.... It's no wonder joints need to be strong and enduring. Failure of *one* joint in a stem at any depth is costly!

Failure of a Flash-Weld joint in field operation is almost unknown! The Flash-Weld Tool Joint, a development of Hughes Tool Company, entirely eliminates the threaded pipe connection—the cause of nearly all drill-stem failures.

Any Hughes field man will tell you more about the construction and value of Flash-Weld joints. A string of Flash-Weld Tool Joints is the most enduring, most economical buy you can make in drill stem. Talk to a contractor who runs them!

FLASH-WELD Tool Joints, a development of

HUGHES
TOOL COMPANY
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